Received: 12 August 2020 | Revised: 9 February 2021 | Accepted: 1 March 2021

DOI: 10.1111/kykl.12267

ORIGINAL ARTICLE

KYKLOS WILEY

A disaster always rings twice: Early life experiences and central bankers' reactions to natural disasters

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Abstract

We analyze the impact of natural disasters experienced in the early life of central bankers to assess their reaction to present-day similar events. We use a panel dataset covering 68 (developed and developing) countries, for the period 2000 Q1 to 2017 Q4, to examine how the very-short-run dynamics of inflation is affected by the (actual) natural disasters, and how past experiences affect the immediate reaction of central bankers to these shocks. Our results reveal that the effect of early-life experiences is significant: central bankers who have been exposed to disasters in early life tend to manage inflation in a more conservative way in the very-short-run. The effect disappears over the course of one year, and central bankers with superior voting power have a larger influence on outcomes. Younger central bankers are more conservative than older ones, which may reveal that the early-life disasters' impact decays over time. The European Central Bank (ECB) appears immune to such influences, in conformity with expectations given the ECB's federal architecture and the size of the area it administers. The behavior revealed by our results thus signifies that central banks tend, on average to avoid any inflationary bias, inducing that the long-run impact of a disaster suffered in the formative years of an individual can bring socially positive consequences, when such an individual becomes governor of her country's central bank.

KEYWORDS
conservatism, inflation, natural disasters, panel

JEL CLASSIFICATION
E02; E58; E71; 01

1 | INTRODUCTION

A natural disaster is a shocking event, and it is not surprising that its consequences can be felt over a lifetime, leaving scars on people, and modifying their preferences and actions. This is now well acknowledged in the field of neuroscience which emphasizes the long-run impact of early-life stressful events (see, for instance, Moles et al., 2004; Franklin et al., 2012).

In economic research, the impact of early-life stressful events is now recognized, termed as the "impressionable years hypothesis" (Eichengreen et al., 2021). Eckel et al. (2009) show that refugees affected by Hurricane Katrina become more risk-loving, a modification they explain by the endured stress. Hanaoka et al. (2018) analyze the behavior of Japanese people impacted by the 1995 Great Earthquake. The research reveals that male survivors tend to gamble more, and confirms the previous results of Page et al. (2014) on the impact of the 2011 Australian floods in Brisbane. Malmendier and Nagel (2011) examine longer-term impacts of early-life stressful events, demonstrating that individuals who have experienced low stock market returns throughout their lives report lower willingness to take financial risk, and are more pessimistic about future stock returns. These "Depression babies", as Malmendier and Nagel (2011) coin them, have different risk-taking attitudes. Giuliano and Spilimbergo (2014), further confirms the "impressionable years hypothesis" finding that those who experienced a recession when young believe that success in life depends more on luck than effort, support more government redistributive policies, and tend to vote for left-wing parties.

For policymakers, Bernile et al. (2017) show that there is a non-monotonic relation between the intensity of CEOs' early-life exposure to fatal disasters and corporate risk-taking (those who experience the extreme downside of disasters behave more conservatively), while Farvaque et al. (2020) find that central bankers who have experienced recessions in their childhood (and, in particular, long recessions) tend to behave in a more dovish way, being more reluctant to increase policy rates than to cut them.

In this paper, we examine at the impact early-life natural disasters make on the immediate reaction of central bankers to similar events, if they face one while they are at the helm of their country's central bank. The direction of the effect is not clear, as it has been shown that natural disasters can impact on inflation differently, depending upon the type of disaster, and the horizon considered (Parker, 2018). Moreover, the reaction of a central banker will depend upon psychological impact of each type of disaster on the individual, and as Parker (2018) further reveals, the impact may not only depend upon the nature of the shock, but also on the intensity of the event.

Hence, if a natural disaster forces central bankers to react to keep inflation under control - even in the very short-term - which is the horizon we look at in this study -, it will be in contexts where the consequences of their policy decisions will be even more uncertain than in "normal" times. In such contexts, it may happen that the long-term impact of past (early-life) experience may conflict with the typical short-term response. This study aims to assess how past and recent disasters interact in policy-making by exploring the behavior of central bankers exposed to natural disasters (earthquakes, floods, droughts, and storms) in their early life. The question we focus on is therefore the following: Is there an influence of early life exposure to natural disasters on the decisions made by central bankers in response to similar disasters?

Our sample includes 198 central bankers from 68 countries, over the period 2000 Q1 to 2017 Q4. The results reveal that past experiences of central bankers induce an immediate reaction to shocks, in the form of a conservative

bias (i.e., a negative impact on very short-term inflation). This allows central bankers to control for the immediate price increases implied by shocks.

The paper is organized as follow. We first review the related literature. We then describe the underlying framework and the data sources. Section 5 follows with a presentation of the empirical strategy, after which Section 6 details the results, and section 7 proposes several robustness checks. Finally, Section 8 sums up the results and provides some policy lessons that can be derived from the analysis.

2 | LITERATURE REVIEW

2.1 | Preferences

In the fields of psychology and sociology, the question of why people have different attitudes, beliefs and personality traits has been discussed widely (see, e.g., Hoffman, 1977; Parke & Asher, 1983). In economics, although the issue has been more recently addressed, there is now a plethora of studies exploring the role of personal experiences in shaping the behavior of individuals, in relation to economic decision and activities.

Beyond neuroscience, which have proved the point for mammals in general and humans in particular (see Moles et al., 2004; Franklin et al., 2012), the fact that strains have long-run effects on people's behavior(s) and preferences has been shown in social sciences. For example, research by Schneider et al. (2012) on the impact of a large fire on victims, reveal that survivors experienced significant life disruption, including occupational, psychological and quality of life sequelae. Importantly, the authors find that quality of life, depression and post-traumatic stress outcomes are related to emotional shock, and not to physical injury. Psychiatric research, including McFarlane (2010) finds that the development of distressing memories at the time of stress exposure creates a major vulnerability of the increasing dysregulation of an individual's neurobiology. The shock has immediate but also delayed effects. As Dye (2018) demonstrates neurobiological changes that impact human development and cause significant changes in brain function can be observed. Medical, and psychiatric empirical evidence, for example research on adverse childhood experiences records (e.g., Reuben et al., 2016) further confirms the impact of childhood adversity and negative life outcomes, demonstrating that such adversity is associated with negative physical, mental, and emotional outcomes that can persist into adulthood.

In economics, it has notably been shown that exposure to higher inflation leads to inflation aversion, higher inflation expectations and lower happiness (Lombardelli & Saleheen, 2003; Blanchflower, 2007; Ehrmann & Tzamourani, 2012; Malmendier & Nagel, 2016). Risk aversion differences are influenced by characteristics including education, age, gender and income (Eckel & Grossman, 2002; Hryshko et al., 2011), and economic disaster such as the global financial crisis of 2008 has made bankers, firms and households more risk averse (Bekaert & Hoerova, 2014; Bassett et al., 2014; Guiso et al., 2018). Similarly, Dohmen et al. (2012) explain that children's behaviors can be impacted by their parents' beliefs on risk taking, while Kim and Lee (2014) show the long-run impact of the Korean war on risk-aversion of the cohorts that have lived through it.

According to Alesina and Giuliano (2011) and Giuliano and Spilimbergo (2014), the timing of growing up significantly impacts on the shaping of preferences: people who have grown up during recessions believe more in luck than in effort, for instance, and tend to be more inclined towards redistribution policies. This conclusion is in line with the results of Emmenegger et al. (2017) which show that early life experience of adverse events scar people in the long run. An unemployment period during youth, for example, can cast a long spell on careers and future political affiliations.

Malmendier and Nagel (2011) describe that, in addition to the instant reaction of economic agents to recent convulsions, the individuals' willingness to take risk is strongly influenced by their life time experiences: in the U. S, agents' willingness to take financial risk is higher for those who have experienced higher real stocks market return over their life time span.

A related paper analyzes how much monetary policymaking by central bankers is influenced by their early experience of growing up in periods of recession (Farvaque et al., 2020). The central bankers who grew up during such recession episodes are found to be more willing to cut policy rates. However, the paper does not consider distressing events other than recession, and only considers a small sample of developed economies.[1]

Otherwise, economic research demonstrates that leaders' background plays a role in macroeconomic developments is well established (see, Besley et al., 2011; Hayo & Neumeier, 2012 for example). Similarly, using different samples, several studies conclude that central bankers' personal characteristics, in particular occupational and educational backgrounds can be important factors (Dreher et al., 2009; Farvaque et al., 2014; Gohlmann & Vaubel, 2007; Farvaque et al., 2011).

2.2 | Natural disasters and inflation

A number of studies have examined the impact of natural disasters on output across different levels of development and sectors of economy (Noy, 2009; Dell et al., 2012; Loayza et al., 2012; Fomby et al., 2013; Felbermayr & Groschl, 2014). This literature is reviewed in Cavallo and Noy (2011), who also survey the effects of disasters on prices. These authors draw attention to the fact that different types of disasters and their magnitudes could have different effects on inflation, even within countries. In Heinen et al. (2019), the focus is put on 15 Caribbean developing economies and the authors exhibit the inflationary impact on prices of extreme weather events.

The mechanism through which disasters hit inflation is that they cause physical destruction and losses which, in turn, lead to a rarefaction of goods and service in the stricken area, resulting into price hikes (adverse supply shock). In the case of a flood or a drought, for example, food prices will increase fast after the shock, which may disrupt the path of inflation, in the short-term. The situation is even more harmful for people located closer to the affected area, and to the poorest among the population. Hence, if a central banker knows, from experience, that a disaster will impact short-run inflation positively, she should react in a conservative way, to immediately keep control of inflation and avoid the cost of a drift from target inflation. Even though the move may seem paradoxical (reacting conservatively, for example by increasing interest rates, while the population suffers immediate costs), and could induce some bashing from the government or the population, such a policy can be considered as an action dedicated to protect the population from a worse situation (in short, a monetary policy designed for the poor - see Romer & Romer, 1999). We thus expect a negative sign of the coefficient attached to the interaction between the present and the past natural disasters.

3 | CENTRAL BANKER'S REACTION TO NATURAL DISASTERS

3.1 | A framework

Why would a central banker react to a disaster? One reason is that such shocks are particular types of supply shocks, which can then induce a typical monetary policy reaction in the short-term (Coeuré, 2018). Such immediate reactions would mean that the inflationary process in a typical economy, designated by *j*, which is hit by natural disasters is of the form:

$$\pi_{j,t} = \sum_{D=1}^{n} \left(\mu_{j,D,t} I_{j,D,t}\right) + \alpha_j(CBI;\cdot) + \beta(t) + \theta\left(\lambda_{i,j,t}\right) + X_{j,t} + \varepsilon_{j,t}$$

[1]See also Bordo and Istrefi (2017), for a related analysis on FOMC members.

where $\pi_{j,t}$ indicates inflation in any quarter t, I signals the incidence of a disaster of type D, of which $\mu_{j,D,t}$ is the intensity (marked, for example, by the number of deaths induced by the related disaster). α_j is a country specific indicator variable, which depends, among other institutional variables that can account for the country-specific dynamics of inflation, as the degree of independence of the central bank (*CBI*). $\beta(t)$ is a time-specific function, reflecting the potential impact of any, for example, seasonal influence on inflation. $\theta(\lambda_{i,j,t})$ is the central banker specific term, reflecting how each central banker may affect the inflationary process, given her own degree of conservatism, here indicated by $\lambda_{i,j,t}$.[2] Finally, $X_{j,t}$ is a vector of control variables (e.g., for instance, the degree of openness), allowing for the standard determinants of inflation to play a role, and $\varepsilon_{j,t}$ is the error term.

Such an inflationary process can emerge from the minimization of a loss function by the central bank. Supposing for simplification that the central banker has a single mandate, for controlling price stability, with an inflation target equal to π^*, and assuming also that the central banker has an aversion for any deviation induced on inflation by disasters, for a country j at time t, the central banker i's loss function writes:

$$\mathrm{L_{i,j,t}} = \left(\pi_{\mathrm{j,t}} - \pi^*\right)^2 + \lambda_{\mathrm{i}}\left(\pi_{\mathrm{j,t}} - \pi^{\mathrm{D}}_{\mathrm{j,t}}\right)^2$$

where $\pi^D_{j,t}$ is the specific inflationary impact of a disaster.

The central banker will react more or less strongly to the departure from her inflation target, and to the short-term inflation impulse induced by a disaster, depending on the trade-off she makes between the "core" inflation, and the disaster-induced gap. By analogy with the analysis of human capital accumulation in childhood by Almond et al. (2018), and building on Heckman (2007), we assume that the preferences of a central banker are built according to a multi-factor Cobb–Douglas function, of the following type:

$$\lambda_i = A_i \Lambda_i^{1-\sum_{D=1}^{n}\alpha_D} \sum_{D=1}^{n} \left(1 + \mu_{jD} \ln(1 + I_D)\right)_i^{\alpha_D}$$

where λ is the degree of conservatism of a central banker, designated by i, after her childhood experiences. These are formed according to some parental investment (which we assume is embedded in the productivity factor, A), and some self-investment (which is denoted by the first term, Λ). However, the experiences that the central banker has faced through her childhood and formative years can also influence her degree of conservatism. In particular, we focus here on the different types of natural disasters that the central banker may face in her "impressionable years" (Eichengreen et al., 2021).

Without loss of generality, let's consider two types of disasters (for example, floods and storms), I_D, with $j = 1, 2$. The impact of each type of disaster on the degree of conservatism is given by, respectively, α_1 and α_2. The parameters α_D are such that $0 < \alpha_D < 1$. The relation between α_1 and α_2 will signal the extent to which different types of disasters will have a differentiated (if $\alpha_1 \gtrless \alpha_2$) or identical impact (in the specific case where $\alpha_1 = \alpha_2$) on the formation of a central banker's preferences. In other words, functionally, the different types of early-life disasters will be substitutes, to different degrees.

Suppose, for the sake of illustration, that type 1 disaster are floods and type 2 are storms. A flood will typically reduce the produce and disrupt the delivery of goods, with a positive impact on prices. However, an opposite effect can be expected afterwards, as floods deliver alluvions on exploited soils, increasing food supply. A storm destroys capital and dwellings, but may have a more localized impact on food prices, though increasing the demand for capital goods. In this example, we have $\alpha_1 \ll \alpha_2$, and a central banker being confronted to the two types of disasters in her childhood will be more strongly impacted by storms than floods, conditionally to the severity and intensity of each shock (Heinen et al., 2019; Parker, 2018). In other words, a central banker exposed to shocks with potential

[2]Such a functional form for inflation is similar to the one used in, e.g., Heinen *et al.* (2019).

medium-term positive effects in her childhood will not necessarily react strongly in the present days, when confronted with one of those shocks. However, if some shocks are felt more deeply than others, then the behavior of the typical central banker will be more affected in the long-term, and the present-day reaction would be to react in a stronger way (in other words, to react more conservatively to insulate inflation from the consequences of the shock). Hence, shocks, and more especially those more intensely felt, should induce a higher degree of conservatism. This will tend to have a larger negative impact in the short-run (i.e., impact more short-term inflation).

Precisely, μ_{j1} and μ_{j2} are indicators of the intensity of the shock. They are indexed by *j* to reflect the fact that they can appear at the country level, by opposition with the *Ijs*, which indicate the individual-level impact of a disaster. In empirical terms, *Ij* will be equal to either 1 or 0, being equal to 1 if there is a disaster of type *j*, 0 otherwise. And each of the μ_{jn} will be an indicator of the intensity of the experiences of disasters a central banker has known (here considered in terms of importance – measured by the number of induced deaths).

3.2 | Anecdotal evidence

It is generally difficult for individuals to admit that their reaction is driven to some extent by their past experience, and it is probably even more difficult for officials who are supposed to be experts with a lot of composure. Nevertheless, the way central bankers express themselves when discussing the consequences of natural disasters reveals that they do not discard the consequences such events can have on the economy.

In Kim's (1994) *Memoirs of a Korean Practitioner*, the experience of high inflation in his first years (he was 20 at the end of WWII), explains his work in the different positions he has held (first, at the central bank and, then, in the Korean administration). His personal history is a first-hand account of shortages and disasters (floods and droughts), and of their impact on prices. White (1997), an economist at the Reserve Bank of New Zealand, also describes the consequences expected in case of a major event (in this scenario, an earthquake centered on Wellington), and the conservative reaction the central bank should have to avoid a drift in the general level of prices:

> "A major disaster would likely see upward pressure go onto the prices of some goods and services, such as, for example, construction costs. (…) The (inflation) Policy Targets Agreement under which the Reserve Bank operates provides for such a price level shock to be accommodated, subject to the proviso that monetary policy should ensure that it does not spill over into generalised inflation." (p.341) Or, more firmly: "From that experience, it is clear that allowing any initial shocks to the price level to develop into on-going inflation does not provide a way of avoiding the loss of real income. Inflation may disguise, and reallocate, the real cost, but it can- not bring back what has been lost." (p.337)

In Australia, droughts have recently been a subject of intense scrutiny. The words of Philip Lowe, head of its central bank during a Congressional hearing in 2018, reveal the importance of the issue for monetary policy-making:

> "[Drought is] a very significant issue. We're watching it very carefully. The agricultural sector (…) accounts at the moment for between 12 and 15% of our exports. Hundreds of thousands of people work in the rural sector, and the rural sector is a source of income for many regional communities. So it is a first-order issue. We're watching things carefully. At the last meeting of the Reserve Bank Board we saw rainfall maps for the country, and we haven't done that for a number of years. We're taking it very seriously. It's hard to come up with some specific numbers of the effect on the economy. We've looked back at the very serious drought around the turn of the century. In 2002 and 2003 farm output fell by around 25%, and that knocked a full one percentage point off GDP growth. (…) In that year

> food prices rose by 4 and 1/2%, so it had first-order effects on the economy. The current drought is not as serious as that one, and we all certainly hope it won't be." (Lowe, 2018, p. 11)

Developing countries are no different in this respect, as this excerpt from a speech made in 2016 by the then Governor of the Bank of India, Raghuram Rajan, makes clear:

> "([…] two successive droughts that would have, in the past, pushed inflation into double digits. Despite this success, we hear voices suggesting weakening the fight against inflation. Let me reiterate that macroeconomic stability relies immensely on policy credibility, which is the public belief that policy will depart from the charted course only under extreme necessity, and not because of convenience."

If droughts are an issue, floods bring their own trouble. Gascon (2019) shows how the Federal Open Market Committee discussed the consequences of the 1993 Mississippi River flood, citing, e.g., Kansas City Fed President Thomas Hoenig as saying that:

> "The effect of the flooding is likely to reduce crop output in our area.… On the whole, prospects in agriculture should remain healthy despite this reduction in crops because of price effects."

Hence, central bankers do look over the influence that natural disasters have on the dynamics of prices in their economy, and wish to reduce their detrimental impact.

3.3 | Governors or committees?

Central bankers are recognized for having significant influence, far beyond the walls of the organizations that they run. For instance, central bankers such as Alan Greenspan (for the US), Jean-Claude Trichet, or Mario Draghi (for the Euro area) were nominated "Person of the year" by the *Financial Times* (respectively, in 1998, 2007, and 2012) while Ben Bernanke (for the US) has received this distinction from the *Time* magazine (in 2009). The recognition awarded to such bankers reflects the ascent of independent central banks and the star status of their leaders (Neuenkirch & Tillmann, 2016), but also the perception that they exert significantly more power than the simple relative weight their vote would carry in a committee. And this is not reserved to advanced economies, demonstrated with the recognition of Nigeria's Lamido Samusi and India's Raghuram Rajan among the *Time's* '100 Most Influential People in the World' in 2011 and 2016.

Although monetary policy committees have become a norm more than an exception (Blinder, 2007), governors are still considered to have a predominant position among their peers. This on one hand may be related to an individual chairperson "dominance effect" (a term coined by Riboni & Ruge-Murcia, 2010, to reflect the personal charisma of a central banker). On the other hand, it may also be the outcome of a bargaining process taking place inside the committee (as in Hayo & Méon, 2013), or of the voting rule the committee uses to take decisions (as in Farvaque et al., 2009, for instance). This predominant position is also revealed by the small quantity of dissenting votes. Thornton and Wheelock (2014), for example, show the occurrence of dissent in the US's Federal Reserve as a rare event, with on average 0.54 dissenting vote per meeting, for a committee composed of twelve persons. Moreover, even where dissents are relatively frequent (as in the case of the Bank of England since 1997, for example), the chairperson is very rarely on the losing side of the vote (van Ommeren & Piccillo, 2020). All of these elements demonstrate the need to focus on the governors themselves, while controlling for their relative voting power.

In sum, natural disasters are not neglected by central bankers, if only for their consequences on prices. Governors and chairpersons are therefore the *primus inter pares* to which we should focus our the attention. The

question is thus now to quantify the reaction of monetary policy-makers to such events, which is the focus of the next section.

4 | DATA SOURCES AND DESCRIPTION

4.1 | Central bankers' characteristics

In order to map a central banker's upbringing with adverse events, we need data on his/her date of birth, to relate the adverse events in a country and particular central banker's early life (being defined as prenatal to 25 years of age[3]). To quantify the influence of disasters on central bankers' early life, we gathered and hand-picked data on each central bankers' date of birth from various sources (central banks websites, Wikipedia pages, Who's who, autobiographies, magazines, newspapers, emails and phone calls).

As career perspectives and experience on the job can also modify a policymaker's behavior, we construct a dummy variable that is coded as 1 if the central banker is reappointed and 0 otherwise. Table A1 in the Appendix delivers information on the sample of central bankers for whom the data has been compiled. On average, a central banker is 58-year old, with the youngest one appointed at 29 years, while the oldest in our sample is 79 years old. All in all, 198 central bankers are present in our sample, out of which 43% have been reappointed.

4.2 | Natural disasters

Data on natural disaster comes from the EM-DAT database, built by the Centre for Research on the Epidemiology of Disasters (CRED), using different sources (i.e., UN agencies, insurance companies, non-governmental organizations – NGOs -, insurance companies, press agencies and research institutes). This database offers comprehensive information on natural disasters like earthquakes, storms, floods, droughts, and others across the world starting from 1900. At least one out of the four following conditions must be fulfilled to qualify the entry into the database for a disaster: "i) 10 or more people are reported dead, ii) 100 or more people are reported as affected by the incident, (iii) state of emergency is declared due to the event (iv) there is call a for international aid". These criteria lead us towards the construction of our variables of interest.

We use this database to record the presence of a disastrous event, and to gauge the intensity of the episodes (measured by the number of deaths induced). For the current period (2000 to 2017), we record the number of induced deaths by each disaster. This is done, for both the past and current period, for earthquakes, floods, storms, and droughts. Remarkably, the number of deaths caused by all types of natural disasters is much lower in the current period compared to the past. As can be seen from Table A1 in the Appendix, while earthquakes were not the type of natural disasters with the most lethal consequences, this is the case in the present period as well. On the opposite, droughts have much less dramatic consequences nowadays.[4]

For both the past and present occurrence of deaths related to natural disasters, to reduce the dimension of the number of disasters we consider, we build an index of the experience each central banker has gone through. We rely on a Principal Components Analysis (PCA) from which we extract the main explaining axis (first component, explaining the highest level of variation in the data) This first principal component condenses the information in a single variable from the four disasters we consider. This is then used in the construction of variable of interest, i.e., the interaction term between past and present natural disasters, in the estimated equation.

[3]This definition is based on the results by, for example, Almond (2006).

[4]The oft-reported experience of the drought that has influenced Amartya Sen's vocation is a case in point supporting our argument and the need to consider past droughts, even though present ones are, fortunately, much less devastating. As can be seen in Table A4 in the Appendix, some of the central bankers in the sample were raised in the 1940s, where, for example, the anti-seismic norms for buildings were different, if existing at all.

4.3 | Economic variables

Macroeconomic data for the 68 countries in the sample for the period 2000 Q1 to 2017 Q4 has been taken from various sources. The KOF index data is borrowed from KOF Swiss Economic institute, data on population density and urban population growth is taken from World Development Indicators (WDI). Inflation data, in terms of consumer prices, is gathered from the IMF's International Financial Statistics (IFS). The list of sample countries is given in the Appendix (Table A.3). The sample covers both developed and developing countries.

To this set of variables, we add a control variable related to the degree of independence each national central bank benefits from (which can be understood in the context of the present study as a control of the degree of a central banker's country degree of conservatism – see, for example, Masciandaro & Romelli, 2015; Arnone & Romelli, 2013; Klomp & de Haan, 2010). This includes other features of central banks' institutional characteristics (such as transparency and accountability, for example), while other features of the institutional contexts that would vary less over time, will be taken care of by the country fixed effects, when applicable. We also include population density, and the rate of growth of the urban population (urbanization), to control for the damages that natural disasters can generate.

5 | EMPIRICAL STRATEGY

The aim of this paper is to assess the performance of central bankers, in terms of immediate/very-short-term inflation management, based on their early life experiences and in relation to present-day disasters. Our empirical strategy focuses on matching quarterly macroeconomic data with corresponding natural disasters, for the period 2000 Q1 to 2017 Q4, subject to the availability of data on the key variables used in the panel analysis.

To understand the behavior of central bankers exposed to disasters in their early life in comparison to their counterparts, the estimation strategy considers the interaction between the variables that are representative of the early life experiences and the current episodes of disasters.

The immediate expected reactions from central banks to disasters is to consider them as adverse supply shocks, either because of the entailed destruction of capital and produce, leading to a decline in productivity (Coeuré, 2018).

We estimate an equation that has the following general form:

$$\pi_{j,q} = \alpha + \beta\lambda_{j,\,q} + \gamma X_{j,\,q} + \delta \text{Past Disasters}_{j,\,q} + \rho \text{Current Disasters}_{j,\,q} + \varphi\left(\text{Past Disasters}_{j,\,q} \cdot \text{Current Disasters}_{j,\,q}\right) + \varepsilon_{j,q}$$

where $\pi_{j,q}$represents the dependent variable, i.e., the very short-term inflation rate. As we focus on immediate reactions and very short-term changes in the inflation rate, the definition of inflation ($\pi_{j,q}$) used here is the quarterly log difference in the consumer price index (CPI) in country j between quarter $q + 2$ and $q + 1$. In other words, we use the quarter-to-quarter difference in the inflation rate, this definition being the most relevant with regard to our goal.[5]

In the above equation, $\lambda_{j,\,q}$ indicates the central bankers characteristics (such as age and reappointment) and $X_{j,\,q}$ refers to a vector of macroeconomic control variables. *Past Disasters*$_{j,\,q}$ is the PCA-based index of the natural disasters faced by a central banker in her early life, and *Current Disasters*$_{j,\,q}$ is the PCA-based index of those that were confronted during her term in office. The relation between these two variables (i.e., the interaction between the early life disasters and the ones that are faced during a central banker's term) is our main variable of interest. In other

[5]In a sense, then, the inflation equation can seem relatively far removed from the typical inflation equation found in the macro literature. This is due to the very different focus of the paper, and the equation here captures the key drivers of inflation at the horizon that matters for our investigation. Moreover, the dependent variable is the quarterly log difference in CPI and there are no lagged dependent variables considered, as the disaster will, by definition, break the relation between the previous period value of inflation, and the present-day one.

TABLE 1 Central bankers' reaction to natural disasters: Baseline results

	(1)	(2)	(3)	(4)	(5)
Current natural disasters deaths index	0.089*	0.122**	0.087	0.106*	0.098*
	(0.047)	(0.055)	(0.061)	(0.055)	(0.051)
Past natural disasters deaths index	−0.051	−0.136*	−0.086	−0.278*	−0.168
	(0.126)	(0.070)	(0.066)	(0.142)	(0.163)
(Current natural disasters deaths index)*(Past natural disasters deaths index)	−0.056***	−0.065***	−0.061***	−0.067***	−0.055***
	(0.020)	(0.020)	(0.023)	(0.023)	(0.020)
Age of central banker			0.001	−0.005	−0.002
			(0.009)	(0.009)	(0.008)
Central banker reappointment			0.224**	0.296**	0.217
			(0.114)	(0.142)	(0.223)
Central bank independence			−1.633*	−2.876**	−2.116*
			(0.868)	(1.367)	(1.254)
Population density			0.050	1.283	2.737*
			(0.101)	(1.722)	(1.543)
Urban population growth			−0.317	−0.345	−0.392
			(0.308)	(0.350)	(0.327)
KOF globalization index			−0.046**	−0.037	0.004
			(0.023)	(0.032)	(0.043)
Constant	1.814***	1.181***	5.561***	0.850	−8.420
	(0.186)	(0.197)	(2.018)	(5.628)	(5.480)
Year FEs	Yes	No	No	No	Yes
Country FEs	Yes	No	No	Yes	Yes
Observations	3,065	3,065	3,065	3,065	3,065

Notes: Dependent variable is inflation (quarterly log difference in the consumer price index between quarter $q + 2$ and $q + 1$). Robust standard errors (in brackets) clustered at the country level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively. FEs stands for fixed effects.

words, this variable assesses the mechanism through which a central banker manages inflation, based on her early life experience when faced with similar events during her term. Finally, $\varepsilon_{j,q}$ is the error term.[6]

The experience of natural disasters in the childhood period obviously belongs to each individual's personal experience. The index based on past natural disasters thus has the properties of an individual fixed effect, and it is uncorrelated with the independent variables we consider. In other words, the estimator is unbiased, as we can safely claim here that the unobserved effect is uncorrelated with all explanatory variables in all time periods (a condition emphasized by Bell et al., 2019). Yet, being estimated for each individual, the interaction between the individual past experience and the current one for each country allows us to identify the between-individual, within countries, effect we want to uncover. Also, to control for national simultaneous events and for common time-specific shocks, when the variability of the other variables permits it, we include country and time fixed effects in the estimates.

[6]We do not include governor fixed effects, as they would be colinear with disasters (as revealed by a VIF test).

6 | RESULTS

Table 1 displays our baseline results. The first two columns do not include the control variables, and they show the sensitiveness of our estimates to the inclusion or exclusion of country and time fixed effects. Although it appears that both the past and present values of the PCA-based index for natural disasters are not significant, their interaction is, and strongly so. Moreover, the sign of the coefficient is negative, revealing a conservative reaction. The size of the impact is important, as it reduces the immediate impact of natural disasters by approximately 50% (using model [5] in Table 1, for instance, the coefficient attached to the interaction is equal to −0.055, while the one related to current disasters is equal to 0.98). This is thus policy-relevant, and substantial. Moreover, the negative sign implies a conservative reaction. This can be described as a pro-poor response as, among the population hit by a disaster, the poorest are the most affected (for instance, in an earthquake, the more fragile dwellings will be more affected than the concrete-built houses). While it has been shown that natural disasters can strengthen the links in a society (Toya & Skidmore, 2014), a reaction from the central bank that impedes inflation to go astray can only reinforce this tendency. The results are robust to the inclusion of the control variables, and, although their significance is generally low, they have the expected signs (for instance, both central bank independence and openness receive negative signs).

How long does this reaction to disasters last? In Table 2, we present estimates run over a 1-year horizon after the occurrence of a natural disaster. The first two columns repeat columns (4) and (5) of the previous table, for ease of comparison. As can be seen, the effect disappears over time, and fades away relatively fast: as soon as the third quarter after the event, the interaction term loses significance completely. This reinforces our hypothesis, in two ways: first, this means that the reaction to a natural disaster is effectively immediate, and, second, that our variable of interest is not significant by a statistical artifact (otherwise, this would signify that the variable captures an omitted variable, with no reason for this one to become insignificant afterwards).

Are central bankers with larger voting power more influential when their country faces a natural disaster? It can be stated that a single policymaker can act in a more discretionary way than the chairperson of a board who has to convince and/or negotiate with the members of the decisional committee. In Table 3, we split our sample according to the voting power of the chairperson. As central banks officially use the "one person, one vote" rule, the voting power is defined by the ratio of 1 over the total number of members of each country's monetary policy committee. We then split the sample. The first two columns of Table 3 present the results for the chairperson who have a relatively small voting power (i.e., the monetary policy committee is relatively large, and the governor's vote represents a small share of the total number of votes, the cut being made at bottom 25% of the voting share variable), while the last two columns present the results for the stronger governors (i.e., belonging to the top 25% of the distribution of the vote shares).[7] The results show that the latter are the ones for which the reaction is indeed significant. That is, when governors are more powerful (i.e., represent a larger share of the total votes in the monetary policy committee), the central bank reacts more strongly, and still in the conservative way, than the less powerful ones.

As younger central bankers have gone through the experience of natural disasters in a more recent past, it may be the case that they react more strongly to similar current events than older central bankers. We explore this possibility in a set of estimates displayed in Table 4. The sample is split and each part of Table 4 considers the subsample of, respectively, the "young" and the "old" central bankers. Young is considered to be the central bankers in our sample that belong to the group of the 10% youngest central bankers, the opposite being true for the governors belonging to the other category – i.e., they are the 10% oldest in our sample).[8] As can be seen in the table, age always receives a negative coefficient, and is more significant for the younger category. The interaction between age and the past natural disasters is strongly significant and also negative for those categorized as young, while it is positive, but much less significant for the older central bankers. Hence, it appears that younger central bankers are

[7]The cut is made according to the distribution of the variable, to account for its discontinuity: the bottom 25% of central bankers have a relative voting power inferior to 10%, the corresponding value for the top 25% being 33%.

[8]This again is made in accordance with the distribution of the variable, which is quite concentrated, as the bottom 10% of the central bankers in the sample are at most 48 years old, the top 10% being more than 66 years old.

TABLE 2 Short term to medium term reaction

	Baseline: 1st quarter after event		Next quarters					
	$\pi_{j,q+2}$		$\pi_{j,(q+3)}$		$\pi_{j,(q+4)}$		$\pi_{j,(q+5)}$	
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Current natural disasters deaths index	0.106*	0.098*	0.127**	0.114**	0.104*	0.089*	0.066	0.048
	(0.055)	(0.051)	(0.062)	(0.057)	(0.059)	(0.053)	(0.062)	(0.056)
Past natural disasters deaths index	−0.278*	−0.168	−0.234	−0.169	−0.256*	−0.234	−0.309**	−0.288
	(0.142)	(0.163)	(0.152)	(0.179)	(0.150)	(0.179)	(0.145)	(0.178)
(Current natural disasters deaths index)*(Past natural disasters deaths index)	−0.067***	−0.055***	−0.076***	−0.058***	−0.059**	−0.038*	−0.019	0.001
	(0.023)	(0.020)	(0.024)	(0.021)	(0.023)	(0.019)	(0.031)	(0.027)
Age of central banker	−0.005	−0.002	−0.002	−0.001	−0.002	−0.002	−0.005	−0.006
	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)	(0.009)
Central banker reappointment	0.296**	0.217	0.221	0.143	0.219	0.160	0.224*	0.172
	(0.142)	(0.223)	(0.151)	(0.222)	(0.142)	(0.203)	(0.132)	(0.183)
Central bank independence	−2.876**	−2.116*	−3.965**	−3.067*	−3.846*	−3.074	−3.909	−3.478
	(1.367)	(1.254)	(1.814)	(1.671)	(2.038)	(1.933)	(2.357)	(2.255)
Population density	1.283	2.737*	0.913	2.382	0.631	1.973	0.605	1.782
	(1.722)	(1.543)	(1.641)	(1.443)	(1.542)	(1.398)	(1.441)	(1.348)
Urban population growth	−0.345	−0.392	−0.283	−0.329	−0.201	−0.248	−0.133	−0.186
	(0.350)	(0.327)	(0.299)	(0.277)	(0.242)	(0.224)	(0.183)	(0.167)
KOF globalization index	−0.037	0.004	−0.031	−0.000	−0.020	0.003	−0.012	0.009
	(0.032)	(0.043)	(0.029)	(0.040)	(0.028)	(0.038)	(0.027)	(0.036)
Constant	0.850	−8.420	2.508	−6.109	2.762	−4.734	2.449	−4.204
	(5.628)	(5.480)	(5.643)	(5.340)	(5.331)	(5.303)	(5.176)	(5.358)
Year FEs	No	Yes	No	Yes	No	Yes	No	Yes
Country FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,065	3,065	3,064	3,064	3,062	3,062	3,060	3,060

Notes: Dependent variable is the quarterly log difference of inflation for next quarter in column 1 and 2. Columns 3–4, 5–6 and 7–8 present results for inflation rate of subsequent quarters (q + 3, q + 4 and q + 5, respectively) as the dependent variable. Robust standard errors (in brackets) clustered at the country level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

TABLE 3 Voting power and reaction to natural disasters

	Weak voting power		Strong voting power	
	(1)	(2)	(3)	(4)
Current natural disasters deaths index	0.038	0.032	0.207	0.219
	(0.054)	(0.060)	(0.147)	(0.133)
Past natural disasters deaths index	0.198	0.766*	−0.159	−0.544
	(0.345)	(0.406)	(0.185)	(0.555)
(Current natural disasters deaths index)*(Past natural disasters deaths index)	−0.042*	−0.028	−0.103*	−0.113**
	(0.021)	(0.018)	(0.056)	(0.055)
Age of central banker		0.019		0.004
		(0.015)		(0.011)
Central banker reappointment		−0.358*		0.773
		(0.200)		(0.645)
Central bank independence		−1.746		−1.178
		(2.056)		(1.655)
Population density		1.081		1.498
		(3.279)		(3.562)
Urban population growth		−0.128		−0.636
		(0.101)		(0.731)
KOF globalization index		0.091**		−0.044
		(0.032)		(0.099)
Constant	1.446***	−9.509	2.096***	0.211
	(0.269)	(15.053)	(0.320)	(11.754)
Year FEs	Yes	Yes	Yes	Yes
Country FEs	Yes	Yes	Yes	Yes
Observations	696	696	1,281	1,281

Notes: Column 1 and 2 present results for subsample entailing weak voting power of central banker (lower 25%). Column 3 and 4 present results for subsample entailing strong voting power of central banker (upper 25%). Robust standard errors (in brackets) clustered at the country level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

more conservative than their older counterparts, and this conservativeness is reinforced for those who have been confronted with natural disasters in their formative, impressionable, years. This induces that the impact that past disasters have on central bankers tends to decay over time, and that the reaction of central bankers to natural disasters is stronger for the younger ones.

7 | ROBUSTNESS CHECKS

As a first robustness check, we consider the case of the Euro area. In our context, the European Central Bank (ECB) should serve as an experiment, for a disaster in a single country is a clear asymmetric shock, i.e., one to which the ECB should not react, in theory as well as given its federal structure of decision.

Table 5 displays the results, comparing the reaction for countries that belong to the Euro area to the other ones. As illustrated, the contrast is striking: although the coefficient attached to our variable of interest is negative in the case of the ECB, it is not significant, while it is negative and significant for the other part of the sample. This reveals that the ECB reacts as could be expected from a common central bank, especially one responsible for many countries. Hence,

TABLE 4 Younger vs. older central bankers

	Young central bankers		Old central bankers	
	(1)	(2)	(3)	(4)
Current natural disasters deaths index	0.305 (0.343)	0.803*** (0.222)	0.042** (0.020)	−0.022 (0.025)
Age of central banker	−0.223** (0.079)	−0.529*** (0.126)	−0.081 (0.053)	−0.289** (0.122)
Past natural disasters deaths index	3.208 (4.996)	31.168*** (4.613)	−3.202* (1.832)	−9.438*** (3.221)
(Age of central banker)*(Past natural disasters deaths index)	−0.165 (0.121)	−0.780*** (0.113)	0.045* (0.022)	0.125** (0.049)
Central banker reappointment				0.761 (0.660)
Central bank independence		−0.850 (8.436)		
Population density		29.701* (14.083)		−9.331* (4.515)
Urban population growth		−0.875** (0.395)		0.029 (0.086)
KOF globalization index		0.078 (0.220)		0.168 (0.134)
Constant	8.185** (3.478)	−100.873 (63.479)	6.436 (3.847)	50.306** (21.105)
Year FEs	Yes	Yes	Yes	Yes
Country FEs	Yes	Yes	Yes	Yes
Observations	177	177	211	211

Notes: Column 1 and 2 present results for subsample entailing young central bankers (lower 10%). Column 3 and 4 present results for sub sample entailing old central bankers (upper 10%). Robust standard errors (in brackets) clustered at the country level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

while Drometer et al. (2018) show that the ECB more than proportionally considers the needs of the countries that fare economically worse than the euro area average, this is not the case in front of natural disasters. An explanation of this could come from the localized nature of natural disasters in such a large area, or our focus on the very short-term dynamics of prices. Notwithstanding, this test also provides another supporting evidence for our argument.

A second robustness check comes from the paper by Farvaque et al. (2020), which indicates that central bankers are influenced in their decision by their early life experience of growing up in periods of recession. This raises the possibility that our variable of interest may be capturing other events that have affected central bankers in the formative years. We thus include in our estimates several measures of the impact of recession years in the impressionable years of central bankers. We first consider the total number of years of recession a central banker has known in her first 26 years. We then include the highest number of successive years of recession during the same years: if, say, central banker *i* has gone through 5 years of recession in her first 26 years, it is possible that one recession has lasted for more than 2 years.[9] Third, we include the worst GDP growth rate the central banker has known during the "impressionable years" (the average being here a slightly inferior to zero).

[9]The two figures are the averages values of the respective variables for our sample.

TABLE 5 Euro zone vs. non Euro zone

	Eurozone		Non-Eurozone	
	(1)	(2)	(3)	(4)
Current natural disasters deaths index	0.011 (0.052)	0.046 (0.040)	0.098* (0.055)	0.107* (0.058)
Past natural disasters deaths index	−0.054 (0.079)	−0.192* (0.105)	−0.054 (0.137)	−0.210 (0.187)
(Current natural disasters deaths index)*(Past natural disasters deaths index)	−0.067 (0.128)	−0.028 (0.086)	−0.060*** (0.022)	−0.058** (0.022)
Age of central banker		0.001 (0.004)		−0.002 (0.010)
Central banker reappointment		−0.092 (0.099)		0.255 (0.237)
Central bank independence		−18.126 (12.634)		−2.196* (1.226)
Population density		−2.405 (1.598)		2.969* (1.640)
Urban population growth		0.195*** (0.051)		−0.470 (0.379)
KOF globalization index		−0.092 (0.071)		0.007 (0.049)
Constant	0.861*** (0.160)	36.354** (16.029)	1.982*** (0.209)	−9.027 (6.289)
Year FEs	Yes	Yes	Yes	Yes
Country FEs	Yes	Yes	Yes	Yes
Observations	464	464	2,601	2,601

Notes: Column 1 and 2 present results for subsample entailing Eurozone. Column 3 and 4 present results for sub sample entailing Non-Eurozone countries. Robust standard errors (in brackets) clustered at the country level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Table 6 displays the results. It should be noted that, given the fact that our sample covers many developing countries, availability of GDP data for these countries is limited (if only because some countries did not exist as independent states when the central bankers in the sample were born). This dramatically reduces the number of observations and thus reduces the significance of our variable of interest. However, if the recession-related variables are sometimes significant, they are positive, inducing a dovish bias, while natural disasters have the opposite effect in our framework and baseline estimates. We are thus able to confirm that our natural disasters' hypothesis is not confounding the effect of recessions. Combining the analysis of Farvaque et al. (2020) and the present one thus leads us to the conclusion, *mutadis mutandis* (as the samples and periods are different over the two studies), that central bankers who have experienced recessions in their childhood tend to react in a more dovish way over policy rates, while natural disasters induce a more conservative reaction in terms of inflation control in the very short-run. This conclusion also is reinforced by the above anecdotal comments made by central bankers facing natural disasters.

Finally, we consider monetary aggregates instead of inflation as our dependent variables because, at least in some countries, central banks may have an impact through the direct control of money supply. The results are very similar to the previous ones: the interaction between the past and present natural disasters is negative and significant. This confirms that, as disasters have an impact on prices (as exposed by Parker, 2018, or Heinen

TABLE 6 Natural disasters vs. recession years

	(1)	(2)	(3)
Current natural disasters deaths index	−1.541**	−0.082	0.051
	(0.771)	(0.342)	(0.265)
Past natural disasters deaths index	−0.121*	−0.118*	−0.077
	(0.069)	(0.070)	(0.066)
(Current natural disasters deaths index)*(Past natural disasters deaths index)	−0.104*	−0.080	−0.104
	(0.060)	(0.075)	(0.076)
Total years of recessions experienced in formative years	−0.030		
	(0.054)		
(Current natural disasters deaths index)*(Total years of recessions experienced in formative years)	0.158**		
	(0.067)		
Number of successive years of recessions		−0.108	
		(0.067)	
(Current natural disasters deaths index)*(Number of successive years of recessions)		0.056	
		(0.079)	
Worst GDP growth rate known in formative years			2.679***
			(0.938)
(Current natural disasters deaths index)*(Worst GDP growth rate known in formative years)			−0.557
			(1.170)
Age of central banker	−0.011	−0.020**	−0.021**
	(0.012)	(0.010)	(0.009)
Central banker reappointment	0.121	0.148	−0.114
	(0.285)	(0.263)	(0.218)
Central bank independence	0.473	0.705	0.442
	(0.590)	(0.644)	(0.634)
Population density	0.417***	0.432***	0.376***
	(0.106)	(0.126)	(0.120)
Urban population growth	0.214*	0.242*	0.245*
	(0.118)	(0.124)	(0.126)
KOF globalization index	−0.017	−0.005	0.001
	(0.014)	(0.016)	(0.017)
Constant	1.031	0.490	0.852
	(1.801)	(2.047)	(1.922)
Year FEs	Yes	Yes	Yes
Country FEs	No	No	No
Observations	520	520	546

Notes: Robust standard errors (in brackets) clustered at the country level. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

et al., 2019), central bankers attempt to preempt any drift in the price level in front of a disaster, and especially those who have been confronted to the same kind of events in their early-life, by controlling (here, reducing) the growth in the monetary aggregates.[10]

8 | CONCLUSION

Our results reveal that central bankers who have been exposed when children (i.e., in the impressionable years) to natural disasters (earthquakes, droughts, floods, and storms) tend to manage inflation differently, compared with those who have not faced such events. More specifically, a pro-poor behavior is revealed: while a natural disaster can trigger price increases, acting conservatively avoids the most afflicted by the disaster to also suffer from price drifts. The effect is sizeable and policy-relevant, as the conservative bias reduces by approximately 50% the immediate impact of a natural disaster on inflation.

Our results are particularly noteworthy because allowing prices to increase after a natural disaster would come with important risks for the central bank, firstly, in terms of credibility as the drift would question the commitment of the central bank to the stability of prices, but secondly, in terms of induced costs as taking back the control of inflation after a surge would be costly. The behavior revealed in the results therefore signifies that central banks tend, on average to avoid any inflationary bias. Due to this, the long-run impact of a disaster suffered in the formative years of a individual can have socially positive consequences when such an individual becomes governor of her country's central bank.

This research could be extended in a number of directions. First, the horizon of central bankers' reactions could be extended, to check how a past shock may induce a policy change in case of a protracted drift in the price level, which could be particularly felt after a large-scale event. Second, the use of a much more detailed database of prices by regions or provinces in each of the affected country could reveal the extent of individual price evolution in reaction to disasters, and whether or not natural disasters modify the stickiness of prices.

ACKNOWLEDGEMENT

The authors acknowledge very useful feedbacks from the Editor in charge of the paper, David Stadelmann, and the referee of the journal, as well as from participants in the conference on the Future of Central Banking, the European Public Choice Society, the European Workshop on Political Macroeconomics, and in particular Sascha Bützer, Cécile Couharde, Nicolas Debarsy, Jean-Baptiste Desquilbet, Gary Dymski, Remi Generoso, Ilene Grabel, Matheus Grasselli, Florence Huart, Hubert Jayet, Juliet Johnson, Alexander Mihailov and Stéphane Vigeant. We are also particularly indebted to Davide Romelli, who has shared data on central bank independence. First author acknowledges financial support from Qauid-i-Azam university, Islamabad, Pakistan. The usual disclaimers apply.

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[10]The detailed results are available upon request.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

How to cite this article: Aslam, M., Farvaque, E. & Malan, F. (2021) A disaster always rings twice: Early life experiences and central bankers' reactions to natural disasters. *Kyklos*, 1–20. https://doi.org/10.1111/kykl.12267