


The current macroeconomic environment is associated with a number of risk factors such as unconventional monetary policy and its normalization, very high levels of private and public indebtedness, political uncertainty, and the possibility of infrequent but major shocks. This situation poses **new challenges for decision-makers dealing with macroeconomic risk and for research.**

Under the scientific leadership of Gilles Saint-Paul (PSE, ENS) and the executive leadership of Nicolas Dromel (PSE, CNRS), **the SCOR-PSE Chair aims to investigate these issues**, and more broadly to promote the development and dissemination of macroeconomic risk research. 



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Why a SCOR-PSE Chair on Macroeconomic Risk?

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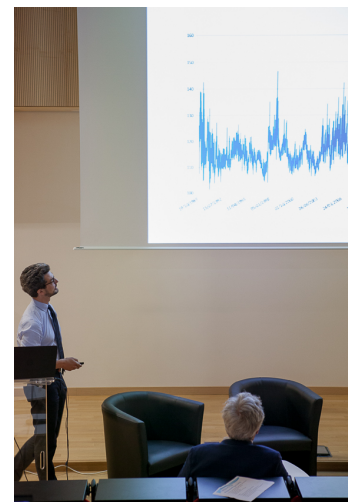
Macroeconomics is traditionally split into two fields: the study of **economic growth** and the study of **regular fluctuations** around an independent long-term growth path. The financial crisis has painfully taught us that **what is in between is at least equally important**: rare events, medium

term developments, regime changes, and the associated uncertainties, have been neglected by mainstream research, not so much out of unawareness as because of the challenges of modelling those issues as well as grasping their empirical significance.

My ambition for the SCOR-PSE Chair on macroeconomic risk is that it will help our profession **learn more about this grey zone of uneven developments** which, while being as important as the drivers of long-term growth, are more volatile and disruptive than regular business cycles.

HIGHLIGHTS FROM THE INAUGURAL CONFERENCE

The inaugural conference of the SCOR-PSE Chair, organized in Paris on June 15, 2018, featured **some of the best international specialists to present and discuss research-frontier papers on macroeconomic risk**. Our goal for the inaugural conference was to cover all the main areas of research around which the Chair is organized. The keynote lecture was given by Xavier Gabaix (Harvard), and a policy panel concluded the event. The following sections ([p3](#) – [p9](#)) provide a summary of the main insights from the conference.



Does Uncertainty Reduce Growth? Using Disasters as Natural Experiments

Baker, Scott R., Nicholas Bloom, Stephen J. Terry, *Does Uncertainty Reduce Growth? Using Disasters as Natural Experiments*, Working Paper, May 2018. [+](#)

The paper was presented by S. Baker (Northwestern, Kellogg) and discussed by Axelle Ferrière (European University Institute).

Since the global financial crisis, concerns about uncertainty and its impact on macroeconomic activity have intensified. Next to the well-known volatility index, VIX, which measures the expectation of stock market volatility as implied by S&P 500 index options, several other measures have been developed to track and analyse different dimensions of uncertainty (*cf. Box 1: selected uncertainty measures*).

FROM UNCERTAINTY... TO UNCERTAINTY?

A large empirical literature has robustly established that uncertainty rises steeply in recessions and recedes in booms. While uncertainty clearly appears to be counter-cyclical, much less unanimity exists about the direction of causality: Does uncertainty drive recessions, for example, due to firms postponing irreversible investment and hiring workers, or do recessions drive uncertainty? Empirical studies face the challenge to find exogenous variations in one variable to identify the causal effect on the other.

Baker, Bloom and Terry address the endogeneity issue using a **novel instrument to estimate the causal effect of uncertainty on economic activity**. The authors rely on **disasters**, such as natural catastrophes, terrorist attacks, political coups and revolutions **as instruments to extract variation in uncertainty that is, at least in the short run, independent from economic activity**. The causal effect is found to be significant and large: a one standard deviation increase in the proxy for uncertainty is estimated to decrease GDP growth in the following year by approximately 3%.

AN INSTRUMENT FOR UNCERTAINTY BUILT ON DISASTERS

The authors collect data on disasters for a quarterly panel starting in 1970 of up to 60 developing and developed countries from various sources (*cf. Box 2: selected data sources on disasters*). Each disaster is weighted by the increase in the daily count of news articles mentioning the affected country in



Access World News over a window of 15 days before and after the event.

The weighting of disasters by their media coverage ensures that only disasters that have not already been anticipated (for example by postponing investment) are considered.



Box 1: selected uncertainty measures

Economic Policy Uncertainty: To measure policy uncertainty, Baker, Bloom and Davis (2016) developed an index based on the frequency of articles in leading newspapers that include variations of the words “economic”, “uncertain”, and “legislation”. Economic Policy Uncertainty indices are publicly available for several countries and continuously updated. [+](#)

Macroeconomic and Financial Uncertainty: The notion of uncertainty underlying the measures developed by Jurado, Ludvigson, and Ng (2015) is the degree of predictability of the economy. The authors fit factor models to 132 macroeconomic variables and 147 financial variables and generate one-, three-, and twelve-month-ahead forecasts. The macroeconomic or financial uncertainty indices are obtained as the time-varying average of the volatilities of individual forecast errors. [+](#)

Interest Rate Uncertainty: The Treasury implied volatility (TIV) index is extracted by Choi, Mueller, and Vedolin (2017) from options written on five, ten or 30 year Treasury futures to measure interest rate uncertainty. [+](#)

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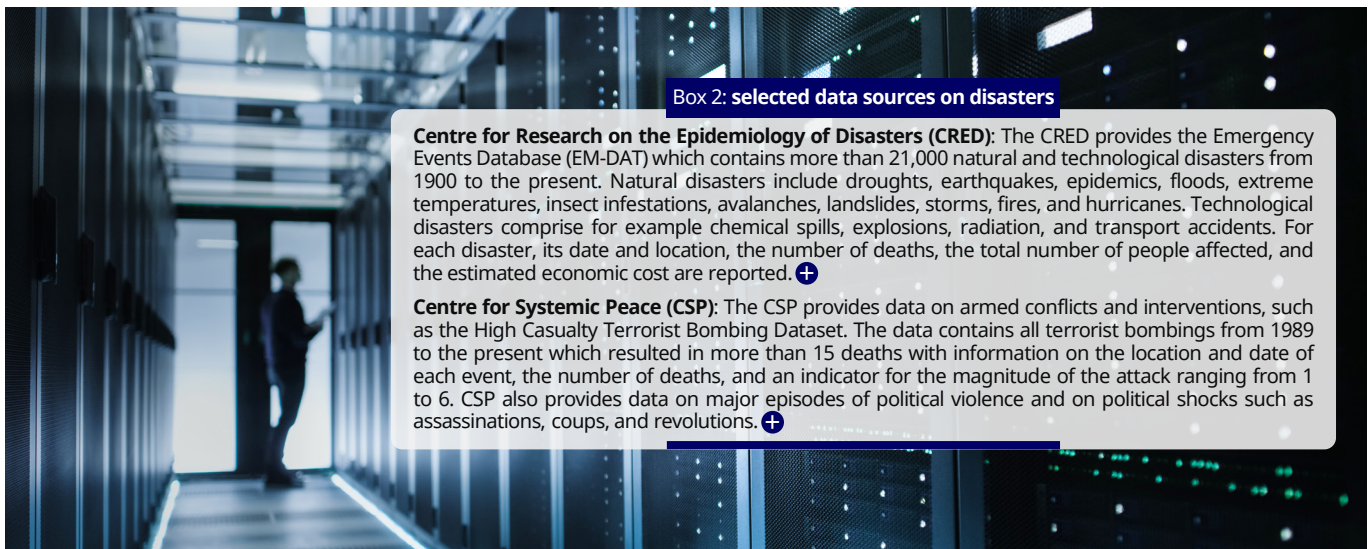
- Baker, Scott R., Nicholas Bloom, Steven J. Davis, *Measuring Economic Uncertainty*, Quarterly Journal of Economics, 131(4), pp. 1593-1636, 2016. [+](#)
- Jurado, Kyle, Sydney C. Ludvigson, Serena Ng, *Measuring Uncertainty*, American Economic Review, 105(3), pp. 1177-1215, 2015. [+](#)
- Choi, Hoyong, Philippe Mueller, Andrea Vedolin, *Bond Variance Risk Premiums*, Review of Finance, 21(3), pp. 987-1022, 2017. [+](#)

In the first step of the estimation, the authors regress their uncertainty proxy on the series of media coverage weighted disasters. Since the latter are arguably exogenous, this allows extracting exogenous variation in uncertainty, which is used in the second step to identify the causal effect on economic activity.

The main uncertainty measure has both a macroeconomic component, stock market volatility, and a firm-level component, the dispersion of stock returns across individual firms of a given

country. **Different types of disasters have heterogeneous impacts on both stock-market volatilities as well as stock-market levels.** For example, while after the 9/11 terrorist attacks, the stock-market fell by 12% and quarterly volatility surged by 300%, natural disasters generally do not have significant effects on stock-market volatility. The impact of the different disasters on GDP growth passes through both, stock-market levels (first-moment effect) and stock-market volatility (second-moment effect).

First- and second-moment effects on growth are found to be large and significant across several uncertainty proxies (stock-market volatility, dispersion of firm-level stock returns across individual firms of a country, or bond price volatility) and sample splits (by country income and size, or by time period). **The effect of uncertainty on growth is found to be at least as important as stock-market levels.**



Learning, Confidence, and Business Cycles

Ilut, Cosmin L., Hikaru Saijo, *Learning, Confidence, and Business Cycles*, NBER Working Paper No. 22958, 2016. + **The paper was presented by C. Ilut (Duke University),** and discussed by Christoph Grosse-Stephen (Banque de France).

In many situations, economic decisions have to be taken without a full probabilistic assessment of possible outcomes. This may be because no theoretical knowledge is available or because too few observations exist to empirically estimate underlying probabilities. Such ambiguity or Knightian uncertainty (so-called after Frank Hyneman Knight, 1885-1972) needs to be distinguished from measurable uncertainty and is likely to significantly influence business cycles. Indeed, **consumer and business confidence indicators**, that arguably measure at least some dimensions of the phenomenon, **stand as powerful predictors in business cycle forecasting models.**

Ilut and Saijo show how **pro-cyclical confidence cycles can endogenously arise in a world where economic agents face Knightian uncertainty** and explore the **implications for macroeconomic fluctuations.**

HIDDEN PROFITABILITY, LEARNING-BY-DOING, AND AMBIGUITY

The informational friction, such that firms cannot directly observe their underlying

profitability, is key to the endogenous confidence mechanism. In order to take optimal hiring and investment decisions, hidden profitability needs to be estimated. To do so, firms use their observation of quantities produced in separate production lines. The more production lines operate, the more observations are available and the more precise the profitability estimate (learning-by-doing). However, firms remain in ambiguity about their estimation. Instead of placing full confidence into their estimates, a set of distributions around it is considered possible; the larger the estimation uncertainty, the wider the ambiguity.

THE EQUILIBRIUM CONFIDENCE CYCLE

Endogenous confidence appears to provide a powerful propagation mechanism generating co-movement of key macroeconomic aggregates such as hours worked, consumption, and investment after any type of shock that drives the business cycles. For example, if firms shrink production in response to a negative productivity, demand or financial shock, estimates of profitability become less precise due to the scale-back of production lines.



Fewer production lines imply less information, such that confidence erodes which further depresses investment, hiring, and production.

The endogenous confidence channel also has **important implications for economic policymaking.** Using quarterly data from the US, experiments with this model show a government spending multiplier much larger than one after three years of the spending shock – a quite different result from more standard business cycle models.

Interest Rate Management in Uncertain Times

Bretscher, Lorenzo, Lukas Schmid, Andrea Vedolin, *Interest Rate Risk Management in Uncertain Times*, The Review of Financial Studies, 31(8), pp. 3019-3060, 2018. [+](#)

The paper was presented by A. Vedolin (Boston University), and discussed by Nuno Coimbra (Paris School of Economics).

With a daily trading volume of almost 3 trillion US\$, **the market for interest rate swaps is one of the most active financial markets in the world.** It allows participants to convert floating interest rates to fixed repayments, and vice versa, so as to hedge against interest rate uncertainty.

THE EFFECTS OF INTEREST RATES ON REAL ECONOMIC ACTIVITY

Bretscher, Schmid and Vedolin show that **interest rate uncertainty has sizable effects on real economic activity.** At the aggregate level, using several proxies, such as the Treasury Implied Volatility (TIV) index (*cf. Box 1: selected uncertainty measures*), they find a one standard deviation change in interest rate uncertainty to predict a 0.365 standard deviation decline in the growth rate of aggregate investment (corresponding to a 25 billion US\$ drop), which is robust to controlling for other forms of uncertainty and business cycle indicators.

This aggregate effect is ultimately driven by decisions taken at the firm level. The authors trace the relation between interest rate uncertainty and investment to the underlying corporate policies and find that firms respond heterogeneously to interest rate uncertainty: **smaller firms with lower net-worth are the most exposed to interest rate risk and uncertainty, and consequently hedge more.**

In the data, firms in the lower tercile of the size distribution swap on average 8.1% of their outstanding debt and are fixed-rate-payers, while firms in the upper tercile are floating-rate-payers and swap on average only about 2.7% of their outstanding debt.

However, even after having swapped a significant amount of floating- to fixed-rate debt, small firms remain more exposed to interest rate uncertainty than larger firms.

The authors build a rich dynamic model of corporate investment, capital structure, and hedging to understand this finding. In their theoretical framework, firms face profitability shocks and can finance investment by a mix of fixed-rate long-term bonds, floating-rate bank debt, and costly equity issuance. Swaps can be contracted to hedge exposure to interest rate risk and volatility. The equilibrium of the model confirms the empirical findings: smaller firms rely more on floating-rate bank debt to meet liquidity needs and are more exposed to interest rate uncertainty, which makes hedging more valuable. An increase in the interest rate pushes small firms with lower net worth closer to default or costly equity issuance, making it beneficial to engage in pay-fixed-receive-floating rate swaps to free-up resources in times when interest rates suddenly rise.

COUNTERFACTUALS: REAL OPTIONS EFFECT, CASH-FLOW EFFECT, AND THE ROLE OF HEDGING

Two explanations are consistent with the finding that interest rate uncertainty comes with significant declines in corporate investment. Either firms delay exercising investment options because investment decisions are irreversible (real options effect), or firms cut back investment because floating-rate debt funding increases cash-flow risk (cash-flow effect).



To disentangle the two effects, counterfactual simulations are performed. The model is calibrated to the 1994-2014 period and investment, financing and hedging decisions of a cross-section of 1,600 firms over 20 years are simulated for (i) the benchmark model, (ii) a model with reversible investment, and (iii) a model with equity financing only. Since the negative effects of interest rate uncertainty persist when investment is reversible but is substantially weakened when firms use equity only to fund investment, the cash-flow effect is found to be the most relevant. Access to swaps is found to significantly dampen the sensitivity of investment to interest rate uncertainty.





The Tail that Keeps the Riskless Rate Low

Kozlowski, Julian, Laura Veldkamp, Venky Venkateswaran, *The Tail that Keeps the Riskless Rate Low*, NBER Working Paper No. 24362, 2018. [+](#) The paper was presented by J. Kozlowski (New York University) and discussed by Philippe Andrade (Banque de France).

Experiencing a crisis can have lasting effects on beliefs of economic agents about macroeconomic risk and economic outcomes. According to Kozlowski, Veldkamp and Venkateswaran **this could be the driver for the persistently low interest rates after the global financial crisis.** Never in recent economic history have interest rates been so low for such a long period of time in most advanced economies. The general downward trend in real interest rates started already in the early 1980s. However, government bond yields additionally fell sharply relative to this trend in the wake of the crisis and failed to rebound even many years after.

THE EFFECTS OF TAIL EVENTS

A growing literature aims to explain why interest rates remained persistently low after the crisis. This paper explores an explanation based on learning about macroeconomic risk. Before 2008, most people in the US thought that a crisis like the one experienced in 2008/2009 can only happen elsewhere in the world. Perceptions changed when the crisis materialized and the question of the likelihood of a new large shock is now routinely asked by the financial industry, policymakers, academics, and journalists. **Tail events like the global financial crisis seem to reshape agents' beliefs about the probability of large adverse shocks and can have long-lasting consequences for the economy.** The increase in perceived tail risks could make safe and liquid assets, such as government bonds, more valuable, drive up their prices, and thereby depress risk-free rates for an extended period of time.

LEARNING ABOUT MACROECONOMIC RISK

For this explanation to work the true probability distribution of shocks hitting the economy must be unknown to economic agents. Agents need to form beliefs about this distribution and use a simple non-parametric estimation technique to do so. Intuitively, it consists in adding, as time goes by, new shock realizations to a histogram of past shock realizations.

Once a tail event materializes, it enters the agents' histogram, stays there, and raises beliefs of large negative outcomes even decades after the event itself has passed. Transitory shocks can generate persistent responses in macroeconomic variables through their persistent effects on beliefs. **The effect of perceived tail risk on interest rates is amplified in the presence of liquidity constraints.** Indeed, liquidity constraints increase the demand for safe assets that can be pledged with banks to obtain funding, and thereby further depress interest rates on such assets.

Using data on capital price and quantity for the US after World War II, the authors construct a time series of quality shocks to US non-residential capital and estimate the model to explain the persistent decline in government bond yields post-2008. The authors find that in the long run **the increase in perceived tail risks caused by the global financial crisis is associated with a 1.45% drop in interest rates** – of which most can be attributed to the liquidity mechanism. Further simulations show that if the crisis was a one-off, interest rates would eventually return to their



pre-crisis level. This re-convergence, however, is very slow, explaining low yields on safe assets for an extended period of time after the crisis.

The authors conclude that “perhaps persistently low interest rates took hold because, after seeing how fragile our financial sector is, market participants will never think about tail risk in the same way again.”

POLICY PANEL

Are we at risk of a new financial crisis?

François de Varenne (SCOR Global Investment), **Olivier Garnier** (Banque de France) and **Gilles Saint-Paul** (PSE, ENS) were invited to share their thoughts in a panel discussion about the current macroeconomic and financial challenges, and the risks of a new financial crisis. The panel was moderated by **Nicolas Dromel** (PSE, CNRS).

SIMILARITIES WITH THE PRE-CRISIS ERA

The question is indeed worth asking, said Gilles Saint-Paul: although we are now 10 years after the fall of Lehman Brothers, some current macroeconomic developments remind features we could observe in the run-up to the last global financial crisis. **Stock market valuations and house prices, for example, have reached and even exceeded their pre-crisis levels.** Doubts about the fundamental value of assets might lead to portfolio re-balancing, maturity and liquidity mismatches in the financial system, and eventually to a freeze in credit to the real sector – a propagation mechanism in many financial crises.

BUT MACROECONOMIC AND FINANCIAL RISKS EVOLVED...

While we do observe similarities, the environment has significantly changed since 2008. Legislators around the world passed micro- and macro-prudential regulations, new supervisory mechanisms were created and banks undertook significant de-leveraging programs. At the same time, massive volumes of financial assets have been exchanged, transferring macroeconomic risks to various sectors of the economy. Sectors in which an increasing share of profits is generated by large financial asset positions need to be closely monitored. **A tremendous amount of liquidity profoundly reshaped the financial system.** Public bail-outs converted private debt into sovereign debt, which in turn found its way – through unprecedented monetary policy measures – on the balance-sheets of central banks.



... AND CREATED NEW CHALLENGES FOR MONETARY POLICY AND ASSET MANAGEMENT

In this fast and profoundly changing environment, **appropriate macro-prudential and monetary policies are essential to anticipate and deal with the new forms of macroeconomic and financial risks**, as explained by Olivier Garnier. François de Varenne highlighted the importance, for a reinsurance company, to be able to pay claims in those events when major asset classes suffer severe losses. **The early detection of possible adverse shocks is of crucial importance** to SCOR which successfully positioned its portfolio since 2007 to protect its value from major shocks. It led SCOR, for example, to completely wind-down its portfolio invested in sovereign debt issued by countries under scrutiny long before the start of the European sovereign debt crisis.

LOOKING FORWARD, WE SHALL PAY ATTENTION TO INFLATION DYNAMICS

Despite the amounts of liquidity injected by central banks around the world, inflation expectations have so far remained stable.

However, should inflation expectations significantly rise, central banks will be called to deliver on their commitment to price stability and adapt monetary policy. The panel concluded that **the path of inflation and the implied monetary policies are key in the short-to-medium run macroeconomic risk analysis.**



SHORT BIOGRAPHIES



François de Varenne is Chief Executive Officer of SCOR Global Investment. He joined the SCOR group in 2005, where he also served as Head of Corporate Finance and Asset Management, Group Chief Operating Officer and Chairman of the Management Board of SCOR Investment Partners.

Before joining SCOR, he was Managing Partner of Gimar Finance & Cie, Insurance Strategist with Lehman Brothers, Vice-President for asset management solutions at Merrill Lynch and then at Deutsche Bank. He joined the French Federation of Insurance Companies (FFSA) in 1993 as Manager of Economic and Financial Affairs. He graduated from the Ecole Polytechnique and the Ecole Nationale des Ponts et Chaussées. He holds a PhD in Economics and an Actuary degree.



Olivier Garnier is Director General for Economics and International Relations at Banque de France. He is a member of the Banque de France Executive Committee. Before joining Banque de France in September 2017, he was the Group Chief Economist of Société Générale and a member of the Group's General Management Committee. He has also been Deputy-CEO and Chief Investment Officer of Société Générale Asset Management. He started his career at the French Ministry of Finance where he held various positions, such as Economic Adviser to the Minister of Finance, and to the Treasury's Director. He also served as an economist at the US Federal Reserve Board in Washington, DC.

Olivier Garnier is a member of the Scientific Advisory Board to the French Financial Market Authority and of the Supervisory Committee of the French pension system. He has also been a member of the Economic Advisory Council to the French Prime Minister. He is a graduate of École Polytechnique, École Nationale de la Statistique et de l'Administration Économique (ENSAE), and the University of Paris-Dauphine.



Gilles Saint-Paul, the scientific director of the SCOR-PSE Chair, is Professor at the Paris School of Economics and École Normale Supérieure, and a Visiting Professor at NYU Abu Dhabi. He is a former member of the Council of Economic Advisors to the Prime Minister of France and a research fellow of IZA, CEPR and CES-ifo. He served as consultant for various central banks, ministries, and international institutions. His research, which spans a variety of macroeconomics topics from labor markets to political economy to bubbles to fiscal policy, has been published in leading journals such as the American Economic Review, Journal of Political Economy, Quarterly Journal of Economics, among others.

He has also authored several books, including, in particular, *The Political Economy of Labour Market Institutions* (Oxford University Press, 2000) and *The Tyranny of Utility* (Princeton University Press, 2011). In 2007 he was awarded the Yrjö Jahnsson medal, which is given every two years to the best European economist under 45.

Disaster risk in macroeconomics and finance

By **Xavier Gabaix (Harvard)**

For the SCOR-PSE inaugural conference, I talked about disaster risk in macroeconomics and finance. It was a great pleasure to give a keynote lecture at this occasion. I took my first classes of economics at École Normale Supérieure, and my two professors of macroeconomics were Gilles Saint-Paul, who holds the SCOR-PSE chair, and Daniel Cohen. They both inspired me and many of my fellow classmates an intense taste for macroeconomics.

Disasters can be either conceived as financial (for example a financial crash) **or as macroeconomic** (as for example a large drop in GDP). For a history of the latter, an excellent reference is Barro and Ursúa (2008) (1), who collected extensive historical data. We observe that macroeconomic disaster risk is indeed a real thing, with dramatic and persistent drops in GDP of sometimes up to 50%, all 30 years or so.

What are the consequences for financial markets? This question is essential, because it could allow to **understand a potentially large part of the activity in financial markets**, and also to use financial markets to predict disasters. In 'Variable Rare Disasters: An Exactly Solved Framework for Ten Puzzles in Macro-Finance' (2012) (2) I systematically study



the hypothesis (proposed by Rietz (1988) (3) and Barro (2006) (4)) according to which risk premia are the result of the possibility of large, rare disasters. In the case of a disaster, the fundamental value of an asset decreases by a time-varying amount. This, in turn, generates time-varying risk premia, and, consequently, volatile asset prices and partial predictability of returns (for example with price-dividend ratios). The model is tractable and all prices can be solved in closed form.

I explain that **ten important puzzles about financial markets can be understood** with this perspective: the high average return of stocks, their volatility, the low returns on short-term debt obligations, the volatility and slope of the yield curve, the high premia on put options (which precisely insure such disasters), etc.

Thus, **financial markets are very influenced by disaster risk, and also contain useful information to diagnose them.**

One can also think about exchange rates and international markets, this is what we do with Emmanuel Farhi in 'Rare Disasters and Exchange Rates' (2016) (5). We propose a new exchange rate model based on potential disasters. The probability of global disasters and the exposure of each country to these events are time-varying. This creates joint fluctuations of exchange rates, interest rates, options and stock markets.

The model can **account for a series of major puzzles in exchange rates**: Excess volatility and exchange rate disconnect, large excess returns of the carry trade

(that is, investing in high-yielding currencies, and borrowing in low-yielding currencies), and the link between exchange rates and telltale signs in currency options.

Thus, financial markets give indications on disasters in exchange rates and stock exchanges of different countries.

Finally, one can use disaster risk in production economies. This is what I do in 'Disasterization: A Tractable Way to Fix the Asset Pricing Properties of Macroeconomic Models' (2011) (6).

One can also **explain fluctuations in investment** as in Gourio (2012) (7) and **unemployment** as in Kilic and Wachter (2017) (8).

All in all, **disaster risk seems extremely important. A central question is: How to avoid it?** This is above all the domain of macro-prudential policy, and, more dramatically of diplomacy and defence policy. Indeed, historically, the largest disasters are associated with wars. But since wars are often caused by economic motives, the economy continues to be essential. The SCOR-PSE Chair will be very useful fostering research in these crucial questions.



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Xavier GABAIX is Pershing Square Professor of Economics and Finance at Harvard's economics department. He received his undergraduate degree in mathematics from the Ecole Normale Supérieure (Paris) and obtained his PhD in economics from Harvard. His research focuses on finance, macroeconomics, and behavioral economics. He received the Fischer Black prize given every two years to the best financial economist under the age of 40, the Bernacer prize given to the best European economist under 40 working in macroeconomics and finance, and the Lagrange and Maurice Allais Prizes. His research has been published in top journals such as the American Economic Review, Econometrica, the Quarterly Journal of Economics, the Journal of Finance, and Nature. He is a Research Associate of the National Bureau of Economic Research and of the Center for Economic Policy Research. He has been selected by the IMF as one of the 25 economists under 45 who are shaping the way we think about the global economy.

Lecture of the SCOR-PSE Chair and awarding of the 2019 SCOR-PSE Young Researcher Award.

COMING NEXT - MARCH 22, 2019

Editorial Committee: Nicolas Dromel, Jonas Heipertz, Camille Ramon, Sylvain Riffé Stern, Gilles Saint-Paul

Contact: sylvain.riffe@psemail.eu

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