

SNB Research Report 2020

SCHWEIZERISCHE NATIONALBANK
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SNB Research Report 2020

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Preface

Dear Reader

It is essential for a central bank to be able to draw on research findings, even more so in times of crisis. Economies are subject to ongoing change, and the understanding of how they work must be constantly kept up to date. The pandemic has made this evident once again as it continues to pose a challenge to the global economy. For this reason, it is important for a central bank to have access to research resources that enable it to keep abreast of the mechanisms which underlie the functioning of the economy and to assess the impact of monetary policy measures taken.

The Swiss National Bank seeks to play a leading role in the research areas that are relevant to the fulfilment of its mandate. The SNB's research staff are encouraged and supported in their challenging tasks. In return, the SNB expects them to have solid knowledge and understanding of relevant research findings. Researchers are also expected to master the latest methods, to be able to apply new results in practice, to communicate their professional expertise internally and externally, and to exchange their findings with their peers from other institutions, especially central banks.

With regard to the exchange of research insights, particular importance is given to conferences, seminars and research visits. Due to the pandemic, a large number of planned research events had to be cancelled in 2020. This is reflected in chapter 4, which documents the SNB's organisation of research events. As was the case for other institutions, the SNB postponed all research conferences scheduled for 2020. Thanks to a rapid switch to virtual approaches, it was possible to successfully hold internal seminars, thus facilitating the exchange among researchers.

Another influence of the pandemic can be observed in the topics selected for research. While the usual research subjects receded into the background somewhat, the new conditions posed by the COVID-19 crisis – including how a pandemic affects inflation – were analysed intensively.

I am pleased to present the SNB Research Report for 2020 and hope that you will find it an interesting and informative read.

June 2021



THOMAS J. JORDAN

Chairman of the Governing Board

This report presents the research activities at the SNB from 1 January to 31 December 2020.

The report is structured as follows:

- Chapter 2 provides a summary of SNB research activities in 2020 and a reader-friendly summary of a paper of particular relevance to central banking.
- Chapter 3 contains an overview of research publications.
- Chapter 4 lists the research events organised by the SNB.
- The appendix focuses on developments in SNB research over recent years.

Research at the SNB

The SNB bases the analyses used for its monetary and financial stability policy on cutting-edge theoretical and empirical economic knowledge. To this end, it conducts its own research and works closely with the research community – especially with researchers from other central banks. Besides providing insights, research also supplies models, tools and analytical instruments for the preparation and implementation of the SNB's monetary and macroprudential policies.

Research at the SNB is largely conducted on monetary and international macroeconomics as well as on the economics of banking, other financial institutions, payment systems and financial markets. The SNB does not maintain a centralised research unit. Instead, research work is carried out in various units.

Researchers at the SNB are economists who undertake research projects alongside the main tasks assigned to them within their unit. The SNB supports research activities and promotes the ongoing development of its researchers' skills.

This chapter summarises and evaluates the SNB's research activities in 2020. Section 2.1 is dedicated to the research publications and section 2.2 outlines the research events.¹ Section 2.3 features a summary of a paper of particular relevance to central banking.

2.1 RESEARCH PUBLICATIONS

This section focuses on the number of articles appearing in research journals and working papers in 2020 compared to 2019.²

Caveat	Published research covers only part of the research undertaken by SNB staff. Although research serves as direct input into decision-making, due to confidentiality, not all work is published or released to the public at a later date. The importance of this research should not be underestimated, even if it is not evaluated and reported here.
Articles in research journals	Compared with 2019, the quantity of published articles decreased significantly (2020: 9, 2019: 28, cf. table 1).
Quality	The articles were published in less prestigious journals than in 2019. This is due to the fact that no article appeared in an A-rated journal, while the majority of articles were published in C-rated journals (2020: 56%, 2019: 36%, cf. table 2). An article in a high-quality journal is allocated an A or B rating, an article in a good journal a C, and an article in a decent-quality journal a D.
Relevance	In 2020, the relevance of published articles increased. The reason for the increase in relevance is that all publications were related to Switzerland and only two were not directly related to central banking (2020: 78%, 2019: 32%, cf. table 3).
Relevance, quality and quantity	Combining relevance and quality, articles published in C-rated journal exhibit mainly medium relevance, while publications in D-rated journals tend to be of high relevance (cf. chart 1).

¹ Further information about these research activities can be found in chapters 3 and 4 of this report.

² The number of articles in research journals and SNB Working Papers published by SNB staff in recent years is provided in the appendix.

Table 1

COMPLETED RESEARCH: QUANTITY

	2020	2019
Articles in research journals	9	28
Of which, <i>SNB Economic Studies</i>	–	–
Contributions to books	39 ³	–
Dissertations	–	1

Table 2

ARTICLES IN RESEARCH JOURNALS: QUALITY

	2020	2019
A journals	0%	14%
B journals	11%	7%
C journals	56%	36%
D journals	33%	43%

Table 3

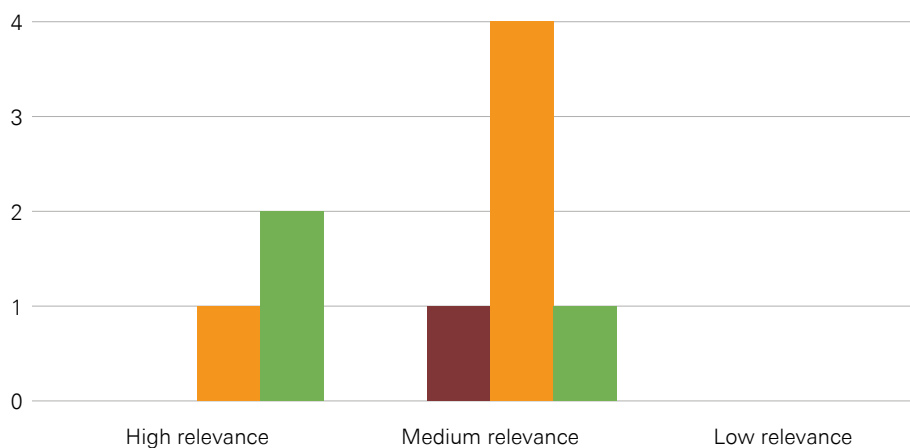
ARTICLES IN RESEARCH JOURNALS: RELEVANCE CRITERIA

2020 (2019)	Related to Switzerland		Total	
	Yes	No		
Directly related to central banking	Yes	78% (32%)	0% (22%)	78% (54%)
	No	22% (14%)	0% (32%)	22% (46%)
Total		100% (46%)	0% (54%)	100%

Chart 1

RELEVANCE, QUALITY AND QUANTITY IN 2020

Number of published articles



Source(s): SNB

3 The SNB's Legal Service published a book entitled *Nationalbankgesetz: Bundesgesetz über die Währung und die Zahlungsmittel* containing 35 contributions by SNB employees.

The number of articles published in the SNB Working Paper series increased fourfold compared to 2019 (2020: 25, 2019: 6).⁴ Note that 2019 was an outlier (cf. *SNB Research Report 2019*). 2020 is again more in line with the trend.

Table 4

ONGOING RESEARCH: QUANTITY

	2020	2019
Working papers	32	14
Of which, SNB Working Papers	25	6
Of which, other working papers	7	8

2.2 RESEARCH EVENTS

An extensive exchange with members of the research community, especially with those at other central banks, is a requirement for research. Table 5 shows some key figures of further research activities conducted by the SNB.

Table 5

SUPPORT OF RESEARCH ACTIVITIES: OVERVIEW

	2020	2019
SNB Research Seminars	8	40 ⁵
SNB Technology and Finance Seminars	13	4 ⁵
SNB research visitors	–	1
SNB Research Lectures	–	–
Research conferences	2	10

SNB seminars

The SNB regularly invites external researchers to present their research results at seminars. In 2020, eight research seminars were held. In 2019, a new seminar series called SNB Technology and Finance Seminars was introduced, focusing on technology-driven topics with financial applications. In 2020, 13 of these seminars took place.

SNB research visitors

Research visitors give advice, exchange views, hold seminars and may undertake joint research projects with SNB staff. They are only present for a limited period of time. Due to the pandemic, there were no research visitors at the SNB in 2020.

Research conferences

The SNB organises conferences, mostly in cooperation with other institutions, at the SNB or elsewhere. Conferences are an opportunity to present and discuss papers as well as to review research in a particular area. Due to the pandemic, the SNB decided to postpone all research conferences. However, it was a member of the programme committee of two conferences organised by other institutions.

⁴ The quantity of SNB Working Papers published by SNB staff in recent years is shown in the appendix (cf. section 5.1).

⁵ In 2019, the number of SNB Technology and Finance Seminars was included in the total number of SNB Research Seminars.

2.3 FEATURED ARTICLE

A bank's economic capital – the difference between the present value of its incoming and outgoing cash flows – is exposed to nominal interest rate movements. An important question in this context is how banks' exposure to interest rate risk (see box 1a) affects bank lending as, on average, interest rates on fixed-term assets are typically locked in for longer than interest rates on short-term liabilities.

In their paper 'The impact of interest rate risk on bank lending',⁶ Toni Beutler, Robert Bichsel, Adrian Bruhin (University of Lausanne) and Jayson Danton examine this question and show that bank lending is affected by realised interest rate risk. Their research contributes to a better understanding of the transmission of monetary policy through the banking system.

The impact of interest rate risk on bank lending

The authors focus on the *bank capital channel*, which describes how a change in interest rates influences a bank's lending via its effect on the bank's economic capital. When interest rates rise, the bank loses part of its economic capital because the present value of its long-term assets declines more than the present value of its short-term liabilities. This loss in economic capital brings the bank's capitalisation closer to the regulatory minimum and, thus, impairs its capacity to lend.

The bank capital channel is likely to be stronger for banks with more interest rate risk exposure. Such highly exposed banks have a wide repricing maturity mismatch (see box 1b) between their long-term assets and their short-term liabilities. Consequently, for a given rise in interest rates, they experience a larger loss of economic capital and must cut back their lending further.

The authors test this hypothesis with a quarterly supervisory survey on the domestically focused banks in Switzerland. The survey contains detailed information on the banks' maturity profiles between Q1 2001 and Q3 2013. This information allows the authors to construct an individual measure of interest rate risk exposure net of hedging for each bank.

The authors make three findings. First, there is evidence for a strong bank capital channel, as realised interest rate risk affects bank lending through changes in economic capital. In addition, the impact of realised interest rate risk varies substantially between banks, depending on their individual exposure to interest rate risk.

Second, bank lending appears to be driven mainly by capital rather than by liquidity. This suggests that larger capital buffers would make bank lending more resilient against shocks in nominal interest rates, whereas larger liquidity buffers would have only a relatively small effect, or even no effect. One possible explanation for this result is that banks typically held large liquidity buffers over the observed sample period, and thus their lending was not constrained by liquidity.

6 Beutler, Toni, Robert Bichsel, Adrian Bruhin and Jayson Danton. 2020. [The impact of interest rate risk on bank lending](#). *Journal of Banking & Finance* 115(C): 1–20.

Third, the shape of the banks' maturity profiles determines how quickly they adjust their lending to realised interest rate risk. The more quickly realised interest rate risk affects a bank's profits and losses – and not just its economic capital – the more quickly it adjusts its lending.

The results are relevant in various ways for both monetary policy and financial stability. First, they indicate that those attempting to understand how changes in interest rates affect bank loan growth should consider banks' exposure to interest rate risk. Second, heterogeneity in interest rate risk exposure across banks is large, and moderate interest rate shocks could thus cause substantial losses of economic capital at the most exposed institutions by way of the bank capital channel. Finally, the finding that bank lending is mainly driven by capital instead of by liquidity suggests that larger capital buffers make bank lending more resilient against shocks in nominal interest rates.

Box 1a:

Interest rate risk/interest rate risk exposure/realised interest rate risk

The term 'interest rate risk' describes the risk resulting from maturity transformation, i.e. financing long-term fixed interest assets (e.g. fixed-rate mortgages) with short-term variable interest funding (e.g. sight and savings accounts).

The term 'interest rate risk exposure' represents a measurement of exposure to interest rate risk. It is a hypothetical concept that requires certain assumptions and represents the approximate change in a bank's economic capital if nominal interest rates were to increase, across all maturities, by 1 percentage point (as defined in this context).

The term 'realised interest rate risk', in the context of this article, represents the approximate change in a bank's economic capital originating from the realised change in nominal interest rates.

Box 1b:

Repricing maturity mismatch

The term 'repricing maturity mismatch' illustrates the situation in which interest earning assets and interest charging liabilities potentially have different repricing dates.

Imagine a bank that only offers ten-year fixed-rate mortgages and only accepts two-year term deposits. In this context, the interest rates on the term deposits will reprice more quickly than the interest rates on the fixed-rate mortgages, producing a repricing maturity mismatch that exposes the bank to interest rate risk.

This chapter contains an overview of articles published in research journals (cf. section 3.1), contributions to books (cf. section 3.2), working papers (cf. section 3.3) and SNB Quarterly Bulletin Studies (cf. section 3.4).

3.1 ARTICLES IN RESEARCH JOURNALS

Baeriswyl, Romain, Camille Cornand and Bruno Ziliotto. 2020. [Observing and shaping the market: The dilemma of central banks](#). *Journal of Money, Credit and Banking* 52(8): 1973–2005.

Bäurle, Gregor, Daniel Kaufmann, Sylvia Kaufmann and Rodney Strachan. 2020. [Constrained interest rates and changing dynamics at the zero lower bound](#). *Studies in Nonlinear Dynamics & Econometrics* 24(2): 1–26.

Beutler, Toni, Robert Bichsel, Adrian Bruhin and Jayson Danton. 2020. [The impact of interest rate risk on bank lending](#). *Journal of Banking & Finance* 115(C): 1–20.

Haab, David and Thomas Nitschka. 2020. [Carry trade and forward premium puzzle from the perspective of a safe-haven currency](#). *Review of International Economics* 28(2): 376–394.

Kraenzlin, Sébastien, Christoph Meyer and Thomas Nellen. 2020. [COVID-19 and regional shifts in Swiss retail payments](#). *Swiss Journal of Economics and Statistics* 156(14): 1–20.

Lustenberger, Thomas and Enzo Rossi. 2020. [Does central bank transparency and communication affect financial and macroeconomic forecasts?](#) *International Journal of Central Banking* 16(2): 153–201.

Rinawi, Miriam⁷ and Uschi Backes-Gellner. 2020. [Firms' method of pay and the retention of apprentices](#). *Oxford Economic Papers* 72(1): 269–291.

Vidaházy, Viktória and Pinar Yesin. 2020. [Deleveraging and foreign currency loan conversion programs in Europe](#). *Comparative Economic Studies* 62(2)(4): 215–241.

Wicht, Laurence. 2020. [The impact of trade tensions on Switzerland: A quantitative assessment](#). *Aussenwirtschaft* 70(1): 1–34.

⁷ New surname: Koomen.

3.2 CONTRIBUTIONS TO BOOKS

Ebner, Till, Thomas Nellen and Jörn Tenhofen. 2020. [Budget control and payment behavior – evidence from Switzerland](#). In *International Cash Conference – Cash in the age of payment diversity*, Eds. Deutsche Bundesbank. Deutsche Bundesbank.

Plenio, Martin, Matthias Ammann, Guido Boller, Claudio Fäh, Carlo Hamburger, Christina Kessler, Samuel Lötscher and Kathrin Scholl. 2020. [Nationalbankgesetz: Bundesgesetz über die Währung und die Zahlungsmittel](#). Eds. Martin Plenio and Myriam Senn. DIKE.

Reinke, Raphael, Ari Ray, Nils Redeker and Stefanie Walter. 2020. [Putting the Eurozone crisis in perspective](#). In *The Politics of Bad Options: Why the Eurozone's Problems Have Been So Hard to Resolve*, Eds. Stefanie Walter, Ari Ray and Nils Redeker, 33–62. Oxford: Oxford University Press.

Reinke, Raphael, Ari Ray, Nils Redeker and Stefanie Walter. 2020. [Surplus country vulnerability to rebalancing: A comparative analysis](#). In *The Politics of Bad Options: Why the Eurozone's Problems Have Been So Hard to Resolve*, Eds. Stefanie Walter, Ari Ray and Nils Redeker, 150–171. Oxford: Oxford University Press.

Schubert, Renate, Scherwin Bajka and Fatih Öz. 2020. [How clean are “clean” data centers?](#) In *Data centers: Edges of a Wired Nation*, Eds. Monika Dommann, Hannes Rickli and Max Stadler, 106–116. Lars Müller Publishers.

3.3 WORKING PAPERS

Abbate, Angela, Sandra Eickmeier and Esteban Prieto. 2020. [Financial shocks and inflation dynamics](#). SNB Working Papers 2020-13.

Altermatt, Sophie and Simon Beyeler. 2020. [Shall we twist?](#) SNB Working Papers 2020-11.

Bacchetta, Philippe, Rachel Cordonier and Ouarda Merrouche. 2020. [The rise in foreign currency bonds: The role of US monetary policy and capital controls](#). CEPR Discussion Papers 14928.⁸

Baeriswyl, Romain, Kene Boun My and Camille Cornand. 2020. [Double overreaction in beauty contests with information acquisition: Theory and experiment](#). SNB Working Papers 2020-09.

Behncke, Stefanie. 2020. [Effects of macroprudential policies on bank lending and credit risks](#). SNB Working Papers 2020-06.

Beutler, Toni, Matthias Gubler, Simona Hauri and Sylvia Kaufmann. 2020. [Bank lending in Switzerland: Capturing cross-sectional heterogeneity and asymmetry over time](#). SNB Working Papers 2020-12.⁹

⁸ In 2020, this working paper also appeared in the Swiss Finance Institute Research Paper Series 20–51.

⁹ In 2020, this working paper also appeared as Study Center Gerzensee Working Paper 20.04.

- Bhutta, Neil, Andreas Fuster and Aurel Hizmo. 2020. *Paying too much? Borrower sophistication and overpayment in the US mortgage market*. CEPR Discussion Papers 14924.
- Bhutta, Neil, Andreas Fuster and Aurel Hizmo. 2020. *Paying too much? Price dispersion in the US mortgage market*. Finance and Economics Discussion Series 2020-062.
- Cordonier, Rachel and Kenza Benhima. 2020. *News, sentiment and capital flows*. SNB Working Papers 2020-04.
- Dumas, Bernard and Marcel R. Savioz. 2020. *A theory of the nominal character of stock securities*. SNB Working Papers 2020-03.¹⁰
- Fink, Fabian, Lukas Frei and Oliver Gloede. 2020. *Short-term determinants of bilateral exchange rates: A decomposition model for the Swiss franc*. SNB Working Papers 2020-21.
- Fink, Fabian, Lukas Frei, Thomas Maag and Tanja Zehnder. 2020. *The impact of SNB monetary policy on the Swiss franc and longer-term interest rates*. SNB Working Papers 2020-01.
- Fuhrer, Lucas Marc, Marc-Antoine Ramelet and Jörn Tenhofen. 2020. *Firms' participation in the COVID-19 loan programme*. SNB Working Papers 2020-25.
- Grise, Christian. 2020. *The effect of monetary policy on the Swiss franc: An SVAR approach*. SNB Working Papers 2020-02.
- Grise, Christian. 2020. *Lower bound uncertainty and long-term interest rates*. SNB Working Papers 2020-14.
- Guggenheim, Basil and Andreas Schrimpf. 2020. *At the crossroads in the transition away from LIBOR: From overnight to term rates*. BIS Working Papers 891.
- Guggenheim, Basil, Sébastien P. Kraenzlin and Christoph Meyer. 2020. *(In)Efficiencies of current financial market infrastructures – a call for DLT?* SNB Working Papers 2020-24.
- Hwang, In Do, Thomas Lustenberger and Enzo Rossi. 2020. *Does communication influence executives' opinion of central bank policy?* SNB Working Papers 2020-17.
- Jokipii, Terhi, Reto Nyffeler and Stéphane Riederer. 2020. *Exploring BIS credit-to-GDP gap critiques: The Swiss case*. SNB Working Papers.

¹⁰ In 2020, this working paper also appeared as NBER Working Paper 28186.

- Kraenzlin, Sébastien P., Christoph Meyer and Thomas Nellen. 2020. *COVID-19 and regional shifts in Swiss retail payments*. SNB Working Papers 2020-15.
- Kugler, Peter and Samuel Reynard. 2020. *Money, inflation and the financial crisis: The case of Switzerland*. SNB Working Papers 2020-16.
- Maurer, Tim D. and Thomas Nitschka. 2020. *Stock market evidence on the international transmission channels of US monetary policy surprises*. SNB Working Papers 2020-10.
- Rossi, Enzo and Vincent Wolff. 2020. *Spillovers to exchange rates from monetary and macroeconomic communications events*. SNB Working Papers 2020-18.
- Schelling, Tan and Pascal Towbin. 2020. *Negative interest rates, deposit funding and bank lending*. SNB Working Papers 2020-05.
- Stucki, Yannic and Jacqueline Thomet. 2020. *A neoclassical perspective on Switzerland's 1990s stagnation*. SNB Working Papers 2020-22.
- Tola, Albi, Amalia Repele and Miriam Koomen. 2020. *Deviations from covered interest rate parity and capital outflows: The case of Switzerland*. SNB Working Papers 2020-08.
- Wicht, Laurence. 2020. *The margin of importing sectors in the gains from trade*. SNB Working Papers 2020-07.
- Wicht, Laurence. 2020. *A multi-sector analysis of Switzerland's gains from trade*. SNB Working Papers 2020-20.
- Wicht, Laurence and Miriam Koomen. 2020. *Demographics, pension systems, and the current account: An empirical assessment using the IMF current account model*. SNB Working Papers 2020-23.

3.4 SNB QUARTERLY BULLETIN STUDIES

- Fink, Fabian, Lukas Frei, Christian Grisse, Thomas Maag and Tanja Zehnder. 2020. *The response of the Swiss franc to SNB policy rate changes*. SNB Quarterly Bulletin Studies 1/2020.

This chapter reviews research events organised by the SNB, including research seminars (cf. section 4.1), technology and finance seminars (cf. 4.2), research visitors (cf. section 4.3) and research conferences (cf. section 4.4).

4.1 SNB RESEARCH SEMINARS

30 January 2020	<i>Antoine Martin</i> (Federal Reserve Bank of New York) The mid-September 2019 U.S. funding markets stress
7 February 2020	<i>Alexander Chudik</i> (Federal Reserve Bank of Dallas) The heterogeneous effects of global and national business cycles on employment in U.S. states and metropolitan areas
18 February 2020	<i>Haoxiang Zhu</i> (MIT Massachusetts Institute of Technology) FinTech competition, payment data, and bank information
8 September 2020	<i>Jon Frost</i> (BIS Bank for International Settlements) Rise of the central bank digital currencies: Drivers, approaches and technologies
9 October 2020	<i>Caterina Rho</i> (Central Bank of Mexico) A sentiment-based risk indicator for the Mexican banking sector
6 November 2020	<i>Klaus Adam</i> (University of Mannheim) Falling natural rates, rising housing volatility and the optimal inflation target
27 November 2020	<i>Carolin Reiss, Lukas Frei, Benjamin Anderegg</i> FX execution algorithms and market functioning
4 December 2020	<i>Sebastian Schmidt</i> (ECB European Central Bank) Expectations-driven liquidity traps: Implications for monetary and fiscal policy

4.2 SNB TECHNOLOGY AND FINANCE SEMINARS

23 January 2020	<i>Hubert Ritzdorf</i> (PwC) Who controls your smart contracts?
17 February 2020	<i>Leonardo Gammar</i> (Agora) Do we have consensus?
27 February 2020	<i>Adolfo Sarmiento</i> (Banco Central del Uruguay) The e-peso pilot plan: The Uruguayan experience
12 May 2020	<i>Meghan Michel</i> (Independent researcher) Harberger tax experiments in decentralized autonomous organizations
2 June 2020	<i>Ousmène Mandeng</i> (Accenture, London School of Economics and Political Science) Foreign exchange trading with instant settlement in central bank money
18 June 2020	<i>Peter Dittus</i> (SOV Foundation) The Sovereign – The digital currency with identity
26 August 2020	<i>Richard Harmon</i> (Cloudera) Data science for central banks
17 September 2020	<i>Stephen Hansen</i> (Imperial College Business School) Firm-level exposures and stock returns in the wake of COVID-19
23 October 2020	<i>Martin Diehl</i> (Deutsche Bundesbank) Trigger solution
27 October 2020	<i>Ulrich Bindseil</i> (ECB European Central Bank) Digital euro and CBDC remuneration
12 November 2020	<i>James Tromans</i> (Google Cloud) The future of capital markets with AI
10 December 2020	<i>Christian Catalini</i> (Diem Association) Economics of Diem
21 December 2020	<i>Cornelia Stengel</i> (Kellerhals Carrard) Distributed ledger technology legislation in Switzerland (civil law perspective)

4.3 SNB RESEARCH VISITORS

Due to the pandemic, there were no research visitors at the SNB in 2020.

4.4 RESEARCH CONFERENCES

This section presents the conferences co-organised, managed and/or hosted by the SNB.

4.4.1 6th Caucasus, Central Asia, and Mongolia (CCAM) Central Bank Practitioners Peer-To-Peer Workshop

Date	24–26 February 2020
Venue	Joint Vienna Institute, Vienna
Organising committee	Nathan Porter, IMF Joint Vienna Institute Marco Cavaliere, SNB

4.4.2 JME-SNB-SCG Conference: The Real Interest Rate and the Marginal Product of Capital in the XXIst Century

Date	15–16 October 2020
Venue	Study Center Gerzensee, Gerzensee
Organising committee	Dirk Niepelt, Study Center Gerzensee Ricardo Reis, London School of Economics Nicolas Cuche-Curti, SNB

5 Appendix

5.1 HISTORY OF SNB RESEARCH

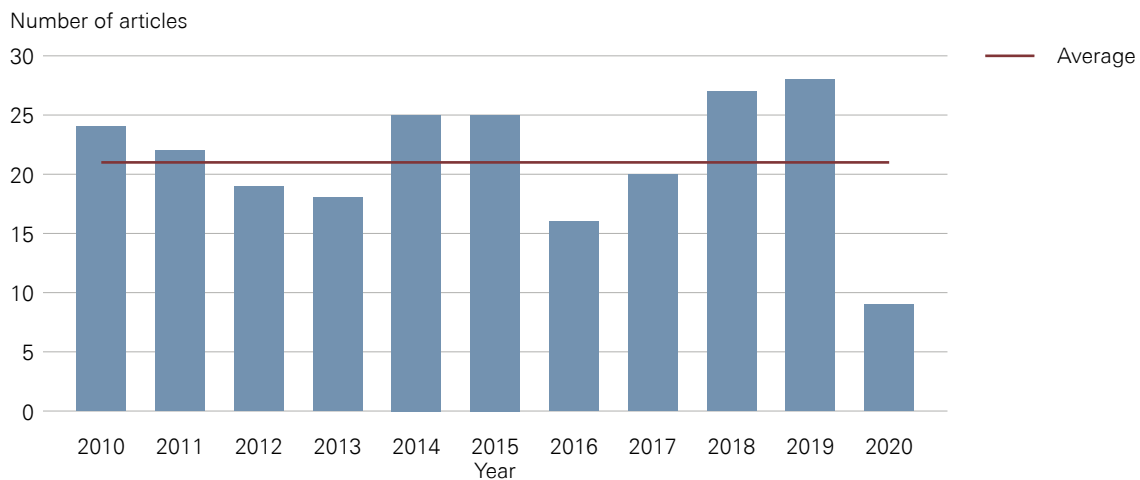
This appendix provides an overview of the quantity of articles in peer-reviewed journals and SNB Working Papers written by SNB staff in the last decade.

Since 2010, a total of 233 articles have been published in research journals (cf. chart 2). This corresponds on average to just over 21 articles per year.

From 2010 to 2020, the number of SNB Working Papers varied between 6 and 25 per year (cf. chart 3).

Chart 2

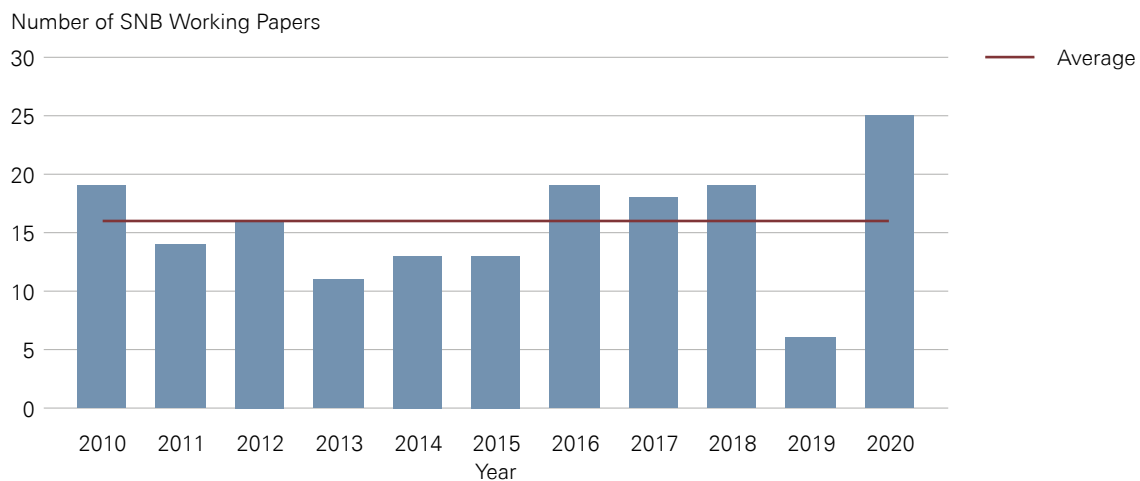
ARTICLES IN RESEARCH JOURNALS



Source(s): SNB

Chart 3

SNB WORKING PAPERS



Source(s): SNB

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Swiss National Bank
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