Analysis

# Investment weakened by uncertainty and the structure of the Finnish economy

Finnish economy | 17 January 2020 | Aino Silvo, Annika Lindblad, Mikko Sariola


AUTHORS



Aino Silvo
Senior Economist



Annika Lindblad
Senior Economist



Mikko Sariola
Adviser



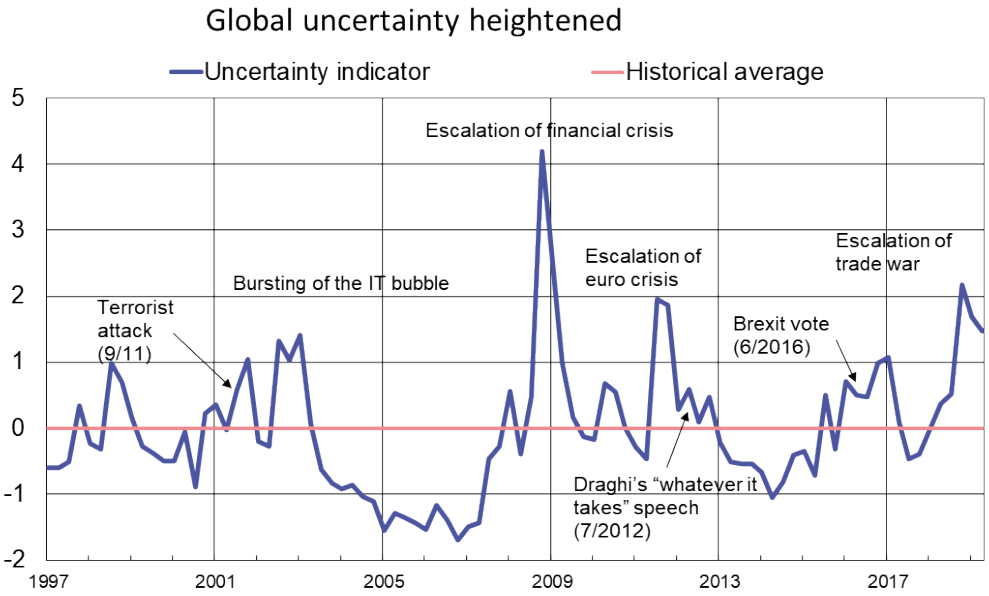
Global uncertainty is weakening growth in business fixed investment in Finland, and its impacts may be felt with a lag. Cyclical fluctuations caused by the uncertainty, however, conceal domestic, structural factors that have weakened investment throughout the 2000s. These factors include weak productivity growth, population ageing and structural changes in the economy towards a services economy. Productivity, in particular, can be influenced by many economic policy measures. Of these measures, innovation policy, for example, plays an important role.




## Modest developments in investment

Investment growth in Finland has been modest since the financial crisis. Private fixed investment is at the level of the mid-2000s. The rate of productive investment, i.e. investment as a percentage of GDP, declined drastically in 2008 and since the crisis investment growth has been fairly subdued (Chart 1).

Chart 1.




Source: Bank of Finland calculations.

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33987@Epavarmuus EN

The weakness of investment may reflect a number of factors. The financial crisis was a global financial market failure that triggered a deep recession in most developed countries – including Finland. In a recession, weak consumption and export demand will also decrease demand for fixed investment as companies curtail activities. The Finnish economy recovered slowly from the 2008–2009 recession.

The sluggish growth in investment in recent years has been explained mainly by heightened global uncertainty. Brexit, trade disputes between the United States and China as well as geopolitical uncertainty may have eroded the investment appetite of export companies, in particular, due to the uncertainties surrounding the path of world trade growth. These, too, are examples of cyclical demand factors.[1]

The weak growth in investment may also be explained by supply-side factors. These are typically

structural factors that have an impact on the medium-term prospects for return on investment. It is possible that companies and investors consider the outlook for productivity growth in Finland to be subdued. The shrinking of the working-age population and structural changes in the economy, with a shift from a manufacturing economy towards a services economy, are structural factors that may explain the dearth of investment. All these factors weaken investors' expectations regarding return on investment.

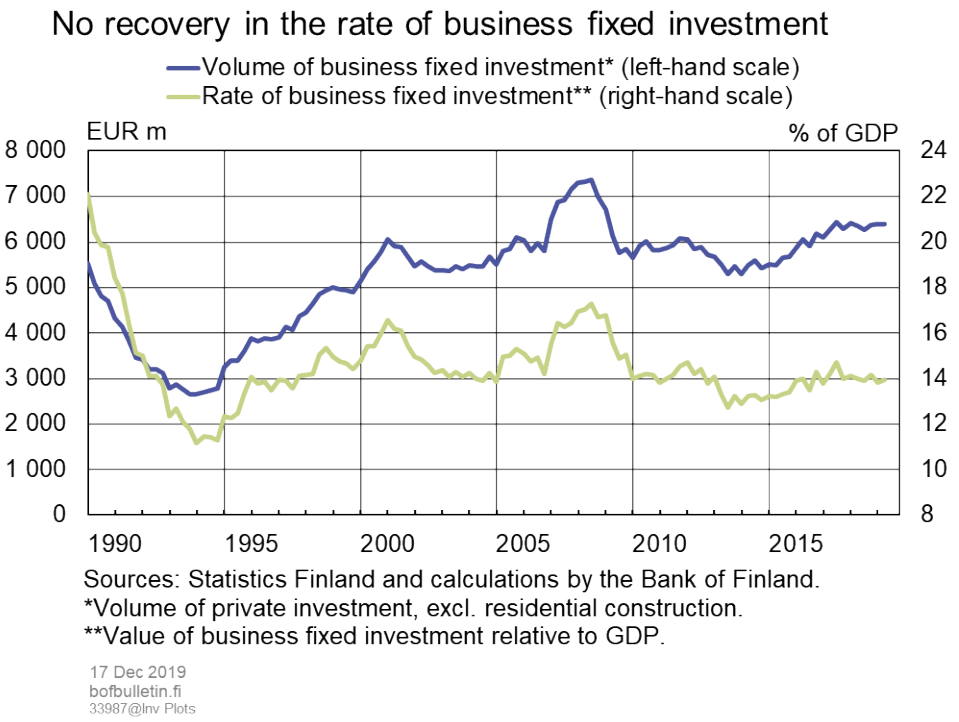
## What may explain the weakness of investment?

The various impacts and the relative importance of demand and supply factors on investment growth can be modelled using time series models. Time series models enable the assessment of the weight of various factors in the development of investment. Due to the simultaneous impact of demand and supply factors as well as global uncertainty on investment, it is difficult to assess their relative importance without a model-based framework.

In this analysis, we use a so-called structural vector autoregressive (SVAR) model that is identified with sign restrictions.[2] We use as variables the volume of domestic private fixed investment[3] and their deflator, i.e. price, and an indicator of global uncertainty. The sample covers the quarters 1997Q1–2019Q2.

Uncertainty can be measured using a number of different variables. In the assessment of investments, particular attention is paid to global uncertainty that has a broad-based impact on the international economy. As uncertainty is a multidimensional issue, we use two measures of uncertainty: the EPU Index[4], which describes policy-related economic uncertainty, and the VIX Index, which measures volatility in the US stock market. The VIX index describes, in particular, uncertainty in the financial markets.

Chart 2.




In our analysis, we compile these uncertainty measures into one indicator of general global uncertainty that describes both economic policy and financial market uncertainty (Chart 2).[5] Global uncertainty reached considerably high levels following the onset of the financial crisis in 2008. Uncertainty also increased in Europe during the debt crisis, particularly in 2012. In the past couple of years, uncertainty has grown again, due to the UK's departure from the EU (Brexit) and heightened trade policy tensions.

In the time series model used in our exercise, the effects of demand and supply factors and the impact of uncertainty are separated with sign restrictions. Based on macroeconomic theory, we define in advance whether these factors will have an upward or downward impact on the volume and price of business fixed investment.

The impact of the strengthening of demand factors on the volume and price of capital goods is assumed as positive. In other words, an increase in investment demand, due to factors independent of supply, increases both the volume and price of investments. Improvements in supply factors, in turn, increase the volume of investment, but at the same time push down their price. For example, enhancement of the production process of a company increases the supply of capital goods and decreases production costs. The model also assumes that demand and supply factors do not have an impact on global uncertainty, which is not affected by Finland's domestic factors. The model also assumes that a decrease in global uncertainty will boost demand for

investment and thus increase their volume and price in Finland. These sign restrictions are summarised in Table 1.[6]

Table 1. Identification of factors affecting investment, using sign restrictions

| **Sign restrictions** | | | |
|---|---|---|---|
| | **Price of investment** | **Volume of investment** | **Uncertainty indicator** |
| Demand factor | + | + | 0 |
| Supply factor | – | + | 0 |
| Uncertainty factor | + | + | – |

## Global uncertainty will slow investment growth for a protracted period

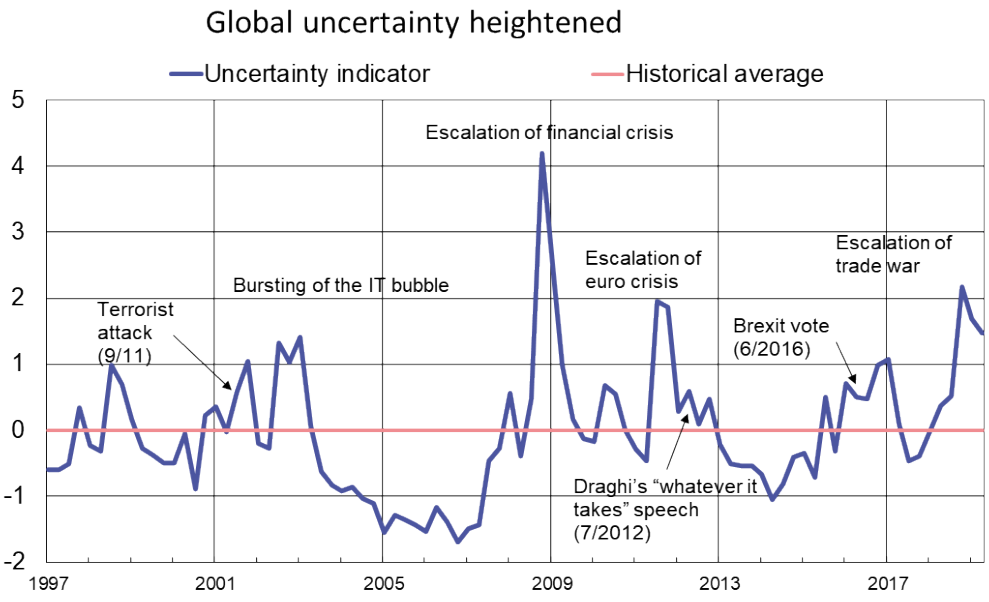
Based on the model results, uncertainty has a significant impact on the developments of business fixed investment (Chart 3). The significance of uncertainty increased in the years just before the financial crisis, as calm sentiment supported the higher-than-average growth in investment. In contrast, during the financial crisis uncertainty rose significantly particularly in the financial markets, which was reflected as weaker growth in investment. The slightly negative impact of uncertainty continued until the early years of the 2010s. Following the easing of the euro area debt crisis – and the famous "whatever it takes" speech by the President of the ECB Mario Draghi in July 2012, uncertainty in the global economy receded again, which strengthened conditions favourable for investment. Uncertainty stemming from global economic policy in recent years has, in turn, slowed growth in investment. Based on the result, it is clear that global uncertainty has had, and still has, a significant role in the development of Finnish investment.

The model results show, however, that fluctuations in uncertainty explain only to a minor degree changes in investment growth in the short term, covering a couple of quarters.[7] Instead, they explain around one quarter of fluctuations in investment growth in the medium term of a couple of years, but also in the long term. In the short term, other demand factors explain the majority of the fluctuation in investment growth. This may be due to the fact that uncertainty does not have an impact on ongoing investment projects, but on decisions on new investments, in particular.

Companies' planning horizon in new investments is usually fairly long, and the investment cycle from the planning stage to deployment may be several years. An increase in global uncertainty is thus reflected in investment growth for a very long time into the future.

Supply-side factors, the other hand – for example expectations for long-term economic growth and productivity developments – explain, in particular, long-term growth in investment. They are therefore, by nature, structural factors.

Chart 3.




Source: Bank of Finland calculations.

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Changes in investment demand, stemming from economic uncertainty, and other demand factors cause cyclical fluctuation in investment. Just before the financial crisis, when the cyclical situation was favourable, demand factors other than uncertainty-related factors supported investment, but the impact turned negative during the financial crisis (Chart 3). In the early 2010s, demand picked up again, which alleviated the lacklustre investment sentiment that was triggered by supply-side factors and uncertainty factors. Weak domestic demand during the period of slow economic growth in 2013 and 2014, on the other hand, dampened investment.

In contrast, supply factors have eroded growth in business fixed investment more or less throughout the period under review. From the early 2000s until 2015, supply factors either had a slowing impact on investment growth or did not have a significant impact on its rate of growth. It is particularly noteworthy that during the years of rapid growth in the first half of the 2000s,

investment was fuelled by robust demand, which masked the structural problems in the supply of investment. In 2015–2017, supply-side factors both strengthened investment growth and dampened the rise in prices for investment, and at the same time, partly offset the weakness stemming from global uncertainty. The stronger investment growth in these years was mainly due to the temporary improvement in total factor productivity. In the past twelve months, the impact of supply factors on investment growth has, however, again been minor or negative.

## Cyclical fluctuations conceal structural problems in investment

The modelling results show that cyclical fluctuation caused by supply factors and uncertainty mask supply-based, structural problems that have dampened investment growth in Finland for a protracted period since the early 2000s (Chart 3).

A simple time series model cannot say with certainty what these supply factors are. We can, however, analyse the correlation of the observed economic factors with the supply factor estimated in the model. Based on macroeconomic theory, the factors affecting the supply of investments include expectations of the real rate of return of investment, growth in total factor productivity, structural change in the economy towards a more service-intensive economy, and the shrinking of the working-age population. Domestic sectors' savings and investments from abroad are channelled via the financial system into fixed investment that can be utilised in production processes. The factors described above, related to the future outlook and growth potential of the economy, have an impact on the willingness of both domestic and foreign investors to fund investments in Finland and therefore on the supply of investment.

Here, structural change is described as the share of manufacturing in the value added of the entire economy. Demographic change is described as the share of the working-age population in the total population. Return on investment is measured as the ratio of corporate operating surplus, i.e. profit, and net capital stock (excl. residential housing).

Results of this analysis are presented in Table 2. They only describe the statistical correlation between the variables and not the cause and effect relationship between the variables. The second column shows the correlation between each variable and the estimated supply factor that has an impact on the volume of investment. The third column in the Table shows the coefficient of determination in a simple regression model with one independent variable, where the estimated supply factor is explained by each observed variable.[8] The coefficient of determination measures the magnitude of the movement in a supply factor explained by movements in each variable.

Table 2. Factors explaining developments in the supply of investment

| Variable | Correlation with the estimated supply factor | Coefficient of determination (%) |
|---|---|---|
| (1) Operating surplus relative to productive net capital stock | 0.28 | 28 |
| (2) Growth in total factor productivity | 0.27 | 27 |
| (3) Labour force participation rate (15-64-year-olds) of total population | 0.28 | 22 |
| (4) Share of manufacturing of total value added | 0.48 | 29 |
| (1) + (2) + (3) + (4) | | 49 |

The Table shows that each variable correlates positively with the estimated supply factor. The strongest correlation is witnessed for the share of manufacturing value added, which is one of the measures of structural change in the economy. Each variable on its own explains 22–29%, i.e. a fairly large portion, of the fluctuation in the supply factor. The last row in the table shows that these four variables together explain about half of the movement in the estimated supply factor.[9]

Based on macroeconomic theory, the volume of investment in the long term is defined mainly by growth in productivity and labour input. Their subdued outlook is also reflected in the weakness of domestic expectations for the return on business fixed investment.

The results shown in Table 2 confirm the interpretation that growth in domestic business fixed investment has been weakened for a protracted period by structural factors, for example the shift in the economy from a manufacturing economy towards a services economy, population ageing, slower growth in total factor productivity, and expected return on investment.

The drastic drop in productivity growth in Finland after the financial crisis is largely explained by the halt in research and development (R&D) investment, which in turn was due to, in particular, the decline in the Nokia-driven electronics industry (Several reasons behind weak labour productivity). Productivity growth has also been slow in other developed countries, however, and intra-industry productivity growth has been sluggish in Finland. The Finnish Productivity Board, moreover, states in its report[10] that weak productivity growth in the manufacturing sector in the

2010s may be explained by the decrease in R&D investment, particularly in electrical engineering and electronics, but also in other subsectors of manufacturing.

Similar conclusions are also presented by, for example, Ali-Yrkkö, Kuusi and Maliranta (2017).[11] According to the authors, the rate of investment has been pushed down by the weak future prospects for productivity growth, and partly also by the anticipated decline in the labour force. They also note that the decline in the investment rate may also be explained by changes in the production structure as well as digitalisation. Large companies have outsourced production to smaller companies and possibly also channelled investments abroad. Digitalisation, in turn, decreases the need for fixed investment. But digitalisation should, however, be reflected as a pick-up in the growth of intangible investment, which thus far has not happened. It is therefore possible that new technologies are spreading to the economy slower than before.

Hukkinen et al. (2015), in turn, note that companies' access to finance in Finland has not hampered investment since the financial crisis.[12] Access to finance has been good and credit standards have eased significantly as a result of accommodative monetary policy.

Itkonen and Mäki-Fränti (2016)[13] note that the weak development in the capital stock may also be explained by the high price of capital goods in Finland relative to the other euro area countries. Return on capital is not sufficient, as before, to cover expensive investments if growth in total factor productivity is weak.

## Productivity growth can be supported by economic policy

Investment improves productivity in the various parts of the production process. And in the long term, productivity growth is the main source of economic growth and improvements to the standard of living. The conditions for productivity growth can be influenced via a variety of economic policy measures, by creating a favourable operating environment for companies, by promoting, for example, the flexible functioning of the labour and housing markets and by ensuring companies' access to finance and the level of educational attainment in the population. In addition, to ensure long-term productivity growth, measures can be taken to improve the incentives for domestic innovation activity and thereby address the weakness of investment in a sustainable manner.

For a developed economy such as Finland, it is increasingly important to take care of its ability to improve productivity with the help of new innovations. In the 20th century – when Finland was far behind the forefront of technology – it was easy to improve the productivity of production activity by taking advantage of our position as a latecomer and by adopting practices and inventions

proven by others. Now, as the Finnish economy is closer to the forefront of technology, innovation, the adoption of new innovations from abroad, and raising the level of productivity require much more effort.

There are however still differences in productivity levels between companies (Divergence of productivity growth in Finnish companies). Company-level productivity can also be improved by other measures than only technological innovation, for example by adopting best practices and thus transitioning closer to the forefront of technology. So-called creative destruction, too, improves productivity in the economy as non-thriving companies exit the market and new companies with higher productivity enter the market.[14]

Research, development and innovation (RDI), however, also play a significant role in the promotion of economic growth. Based on evidence from research literature, supporting RDI activity with public funds may in many cases be useful because, due to the accumulation of knowledge, RDI activity also benefits others, not only those engaged in the RDI activity.

Innovation policy is discussed by, for example, Takalo (2014)[15] and Bloom et al. (2019)[16]. They discuss policy measures that could be effective, at least in some circumstances. These measures include tax policies to favour research and development, attracting educated labour from abroad, policies that support basic research and higher education, and increasing competition between companies both in the goods and labour markets. Hetemäki (2019)[17], too, recommends, for example, tax subsidies to intangible and tangible investment and the promotion by public funds of the openness and transparency of information and projects of artificial intelligence.

Einiö (2013)[18] notes, however, that to be useful, public funding should be channelled particularly to innovation activity that would not be profitable with market-based funding but is socially useful. To ensure the effective allocation of public subsidies, it is important to assess the effectiveness of the subsidies and that they do not replace market-based funding of innovations.

## Improvements in investment require long-term policies

In practice, it is impossible to tackle with domestic policy measures uncertainty that stems from the global environment. At the same time, global economic uncertainty highlights the importance of domestic economic policy. Many structural factors in the economy, such as the increasing share of the service sector in the economy and population ageing, are trends that are difficult to affect via policy measures. The focus should therefore be, in particular, on policy measures aimed at supporting a favourable environment for investment and productivity growth.

Due to the changes in the structure of production and the increasing share of the service sector in the economy, the Finnish economy may be transitioning to a situation in which the rate of investment is permanently lower than in previous decades and there is less need for investment. Increasing investment activity as such cannot therefore be the objective of economic policy. Investment can, however, contribute to ensuring future productivity growth and improvements in the standard of living, also in a service-intensive economy.

Strengthening the operating environment of companies plays a key role in safeguarding the foundations of investment and economic growth in a sustainable manner. The conditions for competition must be ensured both in the goods and labour markets. The market entry of new companies should be encouraged. This promotes the appropriate allocation of labour and capital between the various industries, which in turn supports productivity growth in the entire economy.

Society's engagement in innovation activity requires a long-term innovation policy, the full effects of which will become evident only in the long term. Irrespective of uncertainty and other cyclical fluctuations, policy measures should aim at supporting the long-term factors of economic growth. Population ageing and the shrinking of the labour force will increase the importance of productivity growth as an engine of growth.

## Notes

1. The impacts of uncertainty on the economy and investment are discussed, for example, by Nicholas Bloom, in: Bloom, N. (2014) Fluctuations in Uncertainty. Journal of Economic Perspectives 28 (2), 153–176. ↑
2. For more information on SVAR models, see for example Lütkepohl, H. (2005) New Introduction to Multiple Time Series Analysis, Springer Science & Business Media, and Kilian, L. (2011) Structural vector autoregressions. Handbook of Research Methods and Applications in Empirical Macroeconomics, chapter 22. For more information on sign restrictions, see for example Uhlig, H. (2005) What are the effects of monetary policy on output? Results from an agnostic identification procedure, Journal of Monetary Economics 52, 381–419, and Fry, R. - Pagan, A (2011) Sign Restrictions in Structural Vector Autoregressions: A Critical Review, Journal of Economic Literature 49 (4), 938–960. ↑
3. Private investment, excl. investment in residential construction. ↑
4. The EPU index collects using automated textual analysis, news from the international press that contain words that are related to the economy, policy and uncertainty. The higher the frequency of uncertainty-related terms in economic newspapers, the higher the value of the index. In the global index, the search results from newspapers in 20 countries are weighted by GDP. For more information on the index and the method of collection, see Economic Policy Uncertainty index (https://www.policyuncertainty.com/): Baker, S. R., Bloom, N. & Davis, S. J. (2016) Measuring economic policy uncertainty. Quarterly Journal of Economics 131(4), 1593–1636. ↑

5. Based on a statistical principal component analysis, information from the EPU and VIX indices can be converted into one variable that describes the correlation between these two indices. The SVAR model variable is the first principal component of the EPU and VIX indices. ↑
6. In the SVAR model, the number of lags is two. A total of 10,000 models are estimated, and from these a representative model is chosen. The representative model is the model closest to the median of the impulse responses of all the accepted models. The identification of shocks is based on the assumption that the sign restrictions are valid for a quarter of a year. ↑
7. The impact of various shocks on investment growth with various time horizons can be described with a forecast error variance decomposition (FEVD). ↑
8. Each regression includes a maximum of four lags of the explanatory variable. Here, the coefficient of determination is the adjusted R2 value for each regression. ↑
9. The multivariable regression includes the variables (1)–(4) listed in table 2. From each explanatory variable, the statistically significant lags are included (a maximum of four lag terms). ↑
10. Finnish Productivity Board: State of productivity in Finland. What stopped the growth, will it start again? Publications of the Ministry of Finance 2019:21. ↑
11. Ali-Yrkkö, Jyrki, Kuusi, Tero and Maliranta, Mika: Why Have Business Investments Decreased? ETLA Reports No 70, 16.2.2017. (https://pub.etla.fi/ETLA-Raportit-Reports-70.pdf) ↑
12. Hukkinen, Juhana, Kajanoja, Lauri, Kerola, Eeva, Mäki-Fränti, Petri, Pylkkönen, Pertti and Vauhkonen, Jukka (2015) Mistä investointien vaimeus johtuu? (in Finnish only). Euro & talous 19.10.2015. ↑
13. Itkonen, Juha and Mäki-Fränti, Petri: Kuihtuva pääoma [Shrinking capital]. Analysis article, in Finnish only. Euro & talous 9.2.2016. ↑
14. Creative destruction and its impact on the Finnish economy has been examined, for example, in the report by the Finnish Productivity Board: State of productivity in Finland. What stopped the growth, will it start again? Publications of the Ministry of Finance 2019:21. ↑
15. Takalo, T. (2014) Innovaatiopolitiikan haasteet. Kansantaloudellinen aikakauskirja 3/2014 (in Finnish only). ↑
16. Bloom, N., Van Reenen, J., & Williams, H. (2019)A Toolkit of Policies to Promote Innovation. Journal of Economic Perspectives 33(3), 163–184. ↑
17. Hetemäki, Martti: Investointien edistäminen. Memorandum 17 September 2019. (https://valtioneuvosto.fi/documents/10184/321857/investointien_edistaminen_hetemaki_07102019) ↑
18. Einiö, E. (2013) Innovaatioiden tukeminen kannattaa. VATT Policy Brief 1-2013 (in Finnish only). (https://www.doria.fi/handle/10024/148915.) ↑

## Keywords

investment, productivity, uncertainty