様　式　Ｃ－１９、Ｆ－１９－１、Ｚ－１９　（共通）

科学研究費助成事業　　研究成果報告書

令和　２ 年　 ６ 月 ２２ 日現在

機関番号：８２６４０
研究種目：基盤研究(B)（一般）
研究期間：2017～2019
課題番号：１７Ｈ０２５３２

研究課題名（和文）Quantitative Easing, Financial Markets, and Inflationary Dynamics

研究課題名（英文）Quantitative Easing, Financial Markets, and Inflationary Dynamics

研究代表者
Ｗｉｌｌｅｍ　Ｔｈｏｒｂｅｃｋｅ（Thorbecke, Willem）

独立行政法人経済産業研究所・研究グループ・上席研究員

研究者番号：７０４１９０１８

交付決定額（研究期間全体）：（直接経費）　　3,600,000円

研究成果の概要（和文）：当ＰＪでは、非伝統的金融政策がインフレに与える影響、インフレのダイナミクスの変化、そして政策立案者の有益な政策への追求について調査した。論文では、米国の非伝統的金融政策において、目標に近づく時や外れる場合のインフレの上昇についての投資家の考察や、世界金融危機後数年間で回復した連邦準備銀行の信用、また、世界金融危機による原油価格の米国株価への悪影響と利益、近年の原油価格上昇によるアジアの株式への影響などを論じた。近年強調される中国の輸出とグローバルバリューチェーンについては、関税、貿易戦争、コロナウイルスのパンデミックなどの脅威に際し、バリューチェーンをどのように維持できるかの提案を行っている。

研究成果の学術的意義や社会的意義
I found the Fed has credibility, Quantitative Easing works when inflation is on target, and oil prices affect economies differently now. I reported how supply chains can survive and innovate. I had many papers, presentations and newspaper pieces, helping the findings to percolate into policymaking.

研究成果の概要（英文）：The project investigated how Quantitative Easing affects inflation, how inflation has changed, and draws policy implications. I found investors believed that U.S. unconventional monetary policy would raise inflation when inflation was close to its target but not when inflation was off target. I found the Fed regained credibility to keep inflation from growing out of control after the Global Financial Crisis (GFC). I found that positive oil price shocks harmed U.S. stock prices before the GFC but benefited them after. I found that oil price increases recently have not harmed many stocks in Asia. These last two findings indicate that rising inflation from oil price increases is no longer as important. Researcher highlighted that China's exports and global value chains have contained inflation. This project investigated how Asian value chains work and suggested how they can continue in the face of tariffs, pandemics, and other threats.

研究分野：International Economics

キーワード：inflation　monetary policy　global value chains　oil prices

様　式　Ｃ－１９、Ｆ－１９－１、Ｚ－１９（共通）

１．研究開始当初の背景

Inflation in the world accelerated from the late 1960s to the early 1980s. As unemployment fell, industries ran into supply constraints and wages and input prices rose. This led to price increases that fed back into higher wages, generating a wage-price spiral and accelerating inflation. Oil price increases also stoked inflation and exacerbated this harmful spiral. Monetary policy was unable to halt inflation until drastic (cold turkey) monetary policy was implemented in the 1980s. This contractionary monetary policy led to very high interest rates that produced a severe recession in the world economy and double-digit unemployment rates. Finally inflation fell. Recently unemployment rates in the U.S. and other countries fell to levels that triggered inflation in the 1960s and 1970s but there has been no sign of inflation.

This led to a happy combination of rapid output growth, low unemployment, and quiescent inflation in the U.S. and other advanced economies. This experience was called "the Great Moderation." This was then interrupted by the 2007-2009 Global Financial Crisis (GFC). Central banks lowered policy interest rates and then resorted to Quantitative Easing (QE). Much is known about how policy interest rates affect the economy. Much less is known about how QE affects the economy.

At the same time, there has been a revolution in the way that the U.S. and other countries receive goods. Intricate value chains linking Japan, Taiwan, South Korea, China, and other countries have emerged. In industries such as electronics, Asian value chains totally dominate supply to the world economy. These value chains have witnessed mushrooming productivity growth and falling prices.

It is logical that falling inflation and efficient Asian value chains are related. The supply constraints that cursed the U.S. and other individual economies in the 1970s and led to rising prices and wages became less binding when economies the size of China, Japan, Korea, Taiwan, and the Association of Southeast Asian Economies (ASEAN) work together to supply goods for the world economy. This unbundling of production offers opportunities for efficiency gains and economies of scale that are not possible when goods are produced within a single factory. These efficiency gains then allow prices to fall and inflation to be suppressed.

２．研究の目的

The objective of this research is to study the working and interactions of monetary policy, Asian value chains, and inflation. Does QE influence inflation? Does the Federal Reserve have credibility as an inflation fighter? Do oil prices exert the same negative effects on the economy that were evident in the 20th Century? Are Asian value chains exerting a beneficent influence on inflation and the world economy? How do these value chains work? What has led to the mushrooming productivity growth that helps to keep inflation lower? How can their beneficial effects be preserved in the presence of trade wars, protectionism, and pandemics?

３．研究の方法

The plan is to examine the model that investors use to process news about monetary policy, inflation, oil prices, and other factors. Investors bet billions of dollars on their theories and have an incentive to choose correct ones. In addition the plan involves investigating the workings of Asian value chains.

Several methods are used to investigate the model in the mind of the market. One key approach builds on the work of Ross (1976). He posited that the required return on an asset equals the risk-free rate plus the inner product of a vector of factor loadings with a vector of risk premia:

$$Ei=\lambda_0+\Sigma_j\beta_{ij}\lambda_j \qquad (1)$$

where E_i is the *ex-ante* required return on asset i, λ_0 is the risk-free rate, β_{ij} is the factor loading or beta of asset i to factor j, and λ_j is the risk premium associated with factor j. The *ex-post* return then equals the sum of the *ex-ante* return, a beta-weighted vector of factor innovations, and an error term capturing idiosyncratic risks:

$$Ri = \lambda_0 + \Sigma_j \beta_{ij}\lambda_j + \Sigma_j \beta_{ij}f_j + \varepsilon_i \quad (2)$$

where f_j represents news about macroeconomic factor j and ε_i is a mean-zero error term.

Chen, Roll, and Ross (1986) reported that unexpected inflation, the change in expected inflation, economic activity, the corporate default premium, and the term structure premium are priced macroeconomic factors. Thorbecke (1997) found that monetary policy is also a priced factor.

The purpose of this research is to investigate whether unconventional monetary policy such as quantitative easing (QE) affects investors' perceptions of future inflation, the business cycle in the future and other variables. To identify QE, we use the standard event dating for unconventional monetary policy (see Roach and Rousett (2013).

Suppose that investors expected QE to raise inflation. Then on dates when news arrived that the Fed would implement QE, investors would sell assets such as Treasury bonds that are exposed to inflation. Assets that are more exposed to inflation would see their prices fall more. In the context of equation (2), we can measure assets' exposure to inflation by their inflation betas ($\beta_{i\pi}$). To test for a relationship between QE and inflation betas, one can add the expression $D\beta_{i\pi}\lambda_{d\pi t}$ to equation (2), where D is a dummy variable equaling 1 on the day when news of QE appeared, $\beta_{i\pi}$ is the sensitivity of asset I with respect to inflation, and $\lambda_{d\pi t}$ measures the relationship between inflation betas and *ex-post* returns. If news of QE causes investors to expect more inflation, then $\lambda_{d\pi t}$ will be statistically different from zero. Thorbecke (2000) employed a similar methodology to investigate whether monetary policy sparked inflationary concerns during the 1994 bond market debacle.

These equations can be stacked for all the assets employed and the betas, the risk premia, and the other variables can be jointly estimated using the iterated nonlinear seemingly unrelated regression (INLSUR) technique of McElroy, Burmeister, and Wall (1985). This approach provides consistent estimates of the parameters and allows us to impose the cross-equation restrictions that the risk premia are shared across assets.

The asset return data on the left-hand-side of equation (3) could include stock returns on size and industry portfolios, the returns on gold and silver, and the return on long-term Treasury bonds and other asset return data.

The factors on the right hand side of equation (3) include inflation, industrial production, and the default premium. We measure inflation news, following Boudoukh, Richardson, and Whitelaw (1994), using residuals of a regression of inflation on lagged inflation and current and lagged one-month Treasury bill returns. The other systematic factors used here, following Chen, Roll, and Ross (1986), include the spread between total returns on corporate bonds and Treasury bonds (the default premium), the monthly growth rate of industrial production, and the first difference of the expected inflation series. Data on industrial production come from the Federal Reserve Board. Data on the default premium, the one-month Treasury bill return, and the CPI inflation rate are obtained from Ibbotson Associates. Chen et al. found with earlier data that oil prices are not a priced factor. We can see if that has changed with more recent data.

We also use event studies to investigate the model that investors use. Event studies involve examining how key variables affect asset prices.

As I was working on the project, researchers at the Federal Reserve, the Bank for International Settlements, and other organizations presented powerful evidence that China's exports to the U.S. and global value chains exerted major effects at keeping inflation under control (see, e.g., Gilchrist, S., amd E. Zakrajsek, 2019, and Auer, Borio, and Filardo, 2017). Building on this work, I carefully investigate the workings of Asian value chains and how they can be preserved in the face of trade wars, pandemics, protectionism, and other challenges.. This involves estimating pass-through equations, import and export equations, companies' exposure to key macroeconomic variables, and studies of how Asian supply chains have achieved stunning efficiency gains.

References

Auer, R., C. Borio, and A. Filardo. The Globalization of Inflation: The Growing Importance of Global Value Chains. BIS Working Paper 602, 2017.

Boudoukh, J., M. Richardson, and R. Whitelaw. Industry Returns and the Fisher Effect, *Journal of Finance* 49, 1595–1615 1994.

Chen, N., R. Roll, and S. Ross. Economic Forces and the Stock Market, *Journal of Business* 59, 383 403, 1986.

Gilchrist, S., amd E. Zakrajsek. Trade Exposure and the Evolution of Inflation Dynamics. Federal Reserve Board Finance and Economics Discussion Series Working Paper 2019-007.

McElroy, M., E. Burmeister, and K. Wall. Two Estimators for the APT when Factors are Measured, *Economics Letters* 19, 271-275, 1985.

Roache, S. and M. Rousset. Unconventional Monetary Policy and Asset Prices, IMF Working Paper WP/13/190, 2013.

Ross, S. The Arbitrage Theory of Capital Asset Pricing. *Journal of Economic Theory*. 13, 341–360, 1976

Thorbecke, W. Monetary Policy, Time-Varying Risk, and the Bond Market Debacle of 1994. *Journal of Macroeconomics*, 22: 159-174, 2000.

Thorbecke, W. On Monetary Policy and Stock Returns. *Journal of Finance*, 52: 635-654, 1997.

４．研究成果

1) “The Effect of the Fed's Large-scale Asset Purchases on Inflation Expectations,” *Southern Economic Journal*, 85, 2018, 407-423.

This paper carries out exactly the plan listed in Section 3 and presents strong evidence that Federal Reserve QE policy only affects inflation in the desired way when inflation is close to the Fed’s target. When inflation is far from the target, investors do not trust the policy to have the desired effect.

2) “Nonfarm Employment, Inflationary Expectations, and Monetary Policy after the Global Financial Crisis,” RIETI Discussion Paper 18-E-076.

This paper found that the Fed gained substantial credibility after the GFC. When employment increased, there was no concern that this would generate inflation. Based on the findings in paper 1), this implies that monetary policy has been effective at influencing inflation recently.

3) “Oil Prices and the U.S. Economy: Evidence from the Stock Market,” *Journal of Macroeconomics*, 61, 2019, Article 103137.

This paper reports that positive oil price shocks harmed U.S. stock prices in the past but benefited them after 2010. It also found that oil prices are a priced factor in the arbitrage pricing model. However, the impact of oil prices on ex-ante stock returns was much more beneficial for stocks after 2010 then they were before. This indicates that oil prices are impacting the economy very differently now than they were when inflationary oil price shocks roiled the economy.

4) “How Oil Prices Affect East and Southeast Asian Economies: Evidence from Financial Markets and Implications for Energy Security,” *Energy Policy*, 128, 2019, 628-638.

This paper found that oil price increases in recent years have helped and not harmed many stocks in Asia. This finding implies that the major inflationary shocks that oil price increases wrought on Asian oil importing nations in the 20th century are no longer a major concern. Thus, the whole inflationary environment has changed.

5) “Why Japan Lost Its Comparative Advantage in Producing Electronic Parts and Components,” *Journal of the Japanese and International Economies,* 54, 2019, Article 101050.

This paper highlights the need for continued investment and innovation to maintain the resilience of upstream production in Asian value chains.

"East Asian Value Chains, Exchange Rates, and Regional Exchange Rate Arrangements," *Journal of Asian Economics*, 65, 2019, Article 101132.

This paper examines the working of Asian value chains in detail and then considers how regional cooperation can be used to keep them stable in the face of protectionism and trade wars.

6) "Export Sophistication and Trade Elasticities," *Journal of Asian Economic Integration,* 2, 2020, 1-20 (with Nimesh Salike).

7) "The Exposure of U.S. Manufacturing Industries to Exchange Rates," *International Review of Economics and Finance*, 58, 2018, 538-549.

These papers present evidence that more sophisticated products are more resilient in the face of shocks to trade prices. Given the explosion of tariffs, trade wars, protectionism, and exchange rate shocks, these findings suggest that industrial upgrading can help to maintain the resilience of Asian supply chains.

I was invited to present this work at several venues. These include:

"Lessons from the East Asian Electronics Industry." Harvard University, 12 February 2020.

"Nontraditional Monetary Policy and the Future of the Financial Services Industries." Japanese Economic Policy Association Keynote Address, Chuo University, 16 November 2019.

""East Asian Value Chains, Exchange Rates, and Regional Exchange Rate Arrangements," Workshop on Economic Cooperation in Asia and Europe, Asian Development Bank Institute, 28 October 2019.

"Export Sophistication and Trade Elasticities." Harvard University, 27 August 2018.

"The Exposure of U.S. Manufacturing Industries to Exchange Rates." Harvard University, 29 January 2018.

"Trade and Innovation in the Global Economy, Lessons from the East Asian Electronics Industry." UNP International Workshop, University of Niigata, 1 December 2018.

"The Impact of Oil Prices on East and Southeast Asian Economies: Evidence from the Stock Market." Workshop on: Volatility of Energy Prices and Economic Performances ASEAN Secretariat, Jakarta, 1 August 2018.

I presented papers at some other venues including:

"Why Japan Lost its Comparative Advantage at Producing Electronic Parts and Components." Japanese Economic Network, Bank of Japan, 4 August 2019.

"Oil Prices and the U.S. Economy: Evidence from the Stock Market." Western Economic Association International Meetings, Keio University, 22 March 2019.

"The Effect of the Fed's Large-Scale Asset Purchases on Inflation Expectations." World Finance and Banking Symposium, Bangkok, 14 December 2017

I wrote 12 pieces in the Financial Times, many of them highlighting the findings to a broader audience.

I have written 5 chapters of a book entitled *The East Asian Electronics Industry: Its Emergence, Ascendancy, and Perils.*

５．主な発表論文等

〔雑誌論文〕　計7件（うち査読付論文　3件／うち国際共著　0件／うちオープンアクセス　0件）

１．著者名 Thorbecke Willem	４．巻 128
２．論文標題 How oil prices affect East and Southeast Asian economies: Evidence from financial markets and implications for energy security	５．発行年 2019年
３．雑誌名 Energy Policy	６．最初と最後の頁 628～638
掲載論文のDOI（デジタルオブジェクト識別子） https://doi.org/10.1016/j.enpol.2019.01.044	査読の有無 有
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 －

１．著者名 Thorbecke Willem	４．巻 58
２．論文標題 The exposure of U.S. manufacturing industries to exchange rates	５．発行年 2018年
３．雑誌名 International Review of Economics & Finance	６．最初と最後の頁 538～549
掲載論文のDOI（デジタルオブジェクト識別子） https://doi.org/10.1016/j.iref.2018.06.002	査読の有無 有
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 －

１．著者名 Thorbecke Willem	４．巻 85
２．論文標題 The Effect of the Fed's Large-Scale Asset Purchases on Inflationary Expectations	５．発行年 2018年
３．雑誌名 Southern Economic Journal	６．最初と最後の頁 407～423
掲載論文のDOI（デジタルオブジェクト識別子） https://doi.org/10.1002/soej.12273	査読の有無 有
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 －

１．著者名 Thorbecke Willem	４．巻 54
２．論文標題 Why Japan lost its comparative advantage in producing electronic parts and components	５．発行年 2019年
３．雑誌名 Journal of the Japanese and International Economies	６．最初と最後の頁 101050～101050
掲載論文のDOI（デジタルオブジェクト識別子） https://doi.org/10.1016/j.jjie.2019.101050	査読の有無 無
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 －

１．著者名 Thorbecke Willem	４．巻 65
２．論文標題 East Asian value chains, exchange rates, and regional exchange rate arrangements	５．発行年 2019年
３．雑誌名 Journal of Asian Economics	６．最初と最後の頁 101132～101132
掲載論文のDOI（デジタルオブジェクト識別子） https://doi.org/10.1016/j.asieco.2019.101132	査読の有無 無
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 －

１．著者名 Thorbecke Willem、Salike Nimesh	４．巻 2
２．論文標題 Export Sophistication and Trade Elasticities	５．発行年 2020年
３．雑誌名 Journal of Asian Economic Integration	６．最初と最後の頁 7～26
掲載論文のDOI（デジタルオブジェクト識別子） https://doi.org/10.1177/2631684620910276	査読の有無 無
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 －

１．著者名 Thorbecke Willem	４．巻 61
２．論文標題 Oil prices and the U.S. economy: Evidence from the stock market	５．発行年 2019年
３．雑誌名 Journal of Macroeconomics	６．最初と最後の頁 103137～103137
掲載論文のDOI（デジタルオブジェクト識別子） https://doi.org/10.1016/j.jmacro.2019.103137	査読の有無 無
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 －

〔学会発表〕　計13件（うち招待講演　7件／うち国際学会　3件）

１．発表者名 Willem Thorbecke
２．発表標題 The Impact of Oil Prices on East and Southeast Asian Economies: Evidence from Financial Markets
３．学会等名 Volatility of Energy Prices and Economic Performances
４．発表年 2018年

１．発表者名
Willem Thorbecke

２．発表標題
Trade and Innovation in the Global Economy: Lessons from the East Asian Electronics Industry

３．学会等名
International Trade and Innovation in the Global Economy（招待講演）

４．発表年
2018年

１．発表者名
Willem Thorbecke

２．発表標題
Export Sophistication and Trade Elasticities

３．学会等名
Harvard Center for International Development（招待講演）

４．発表年
2018年

１．発表者名
Willem Thorbecke

２．発表標題
Oil Prices and the U.S. Economy: Evidence from the Stock Market

３．学会等名
WEAI International Conference（国際学会）

４．発表年
2019年

１．発表者名
Willem Thorbecke

２．発表標題
The Effect of the Fed's Large-scale Asset Purchases on Inflation Expectations

３．学会等名
World Finance & Banking Symposium（国際学会）

４．発表年
2017年

１．発表者名
Willem Thorbecke

２．発表標題
The Effect of the Fed's Large-scale Asset Purchases on Inflation Expectations

３．学会等名
Paris Financial Management Conference（国際学会）

４．発表年
2017年

１．発表者名
Willem Thorbecke

２．発表標題
The Exposure of U.S. Manufacturing Industries to Exchange Rates

３．学会等名
Harvard University CID Seminar Series（招待講演）

４．発表年
2018年

１．発表者名
Willem Thorbecke

２．発表標題
Lessons from the East Asian Electronics Industry

３．学会等名
Harvard University CID Seminar Series（招待講演）

４．発表年
2020年

１．発表者名
Willem Thorbecke

２．発表標題
Why Japan Lost Its Comparative Advantage in Producing Electronic Parts and Components

３．学会等名
Japanese Economic Network, Bank of Japan

４．発表年
2019年

１．発表者名
Willem Thorbecke

２．発表標題
East Asian Value Chains, Exchange Rates, and Regional Exchange Rate Arrangements

３．学会等名
Workshop on Economic Integration in Asia and Europe, ADBI（招待講演）

４．発表年
2019年

１．発表者名
Willem Thorbecke

２．発表標題
Non-traditional Monetary Policy and the Future of the Financial Servies Industries

３．学会等名
Japanese Economic Policy Association Keynote Address, Chuo University（招待講演）

４．発表年
2019年

１．発表者名
Willem Thorbecke

２．発表標題
The Effect of the Fed's Large-Scale Asset Purchases on Inflationary Expectations

３．学会等名
World Finance and Banking Symposium, Bangkok

４．発表年
2017年

１．発表者名
Willem Thorbecke

２．発表標題
Lessons from the East Asian Electronics Industry

３．学会等名
Japan-IMF Macroeconomic Seminar for Asia（招待講演）

４．発表年
2018年

〔図書〕　計0件

〔産業財産権〕

〔その他〕

Nonfarm Employment, Inflationary Expectations ...
https://www.rieti.go.jp/jp/publications/dp/18e076.pdf
https://www.rieti.go.jp/users/willem-thorbecke/index_en.html

６．研究組織

	氏名 （ローマ字氏名） （研究者番号）	所属研究機関・部局・職 （機関番号）	備考