Japan and the World Economy 31 (2014) 47–53

Contents lists available at ScienceDirect

Japan and the World Economy

journal homepage: www.elsevier.com/locate/jwe

Short communication

The dynamic contagion of the global financial crisis into Japanese markets☆

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ARTICLE INFO

Article history:
Received 12 May 2013
Received in revised form 15 February 2014
Accepted 6 May 2014
Available online 16 May 2014

JEL classification:
C10
G01
G12

Keywords:
Global financial crisis
Risk premium
Sector index
Dynamic contagion

ABSTRACT

This paper investigates the risk contagion channel of the global financial crisis into Japan using daily data on bond risk premiums for the financial and manufacturing industries from July 18, 2006 to May 25, 2010. We employ a bivariate EGARCH model with the constant exogenous contagion impacts of foreign industries and the time-varying endogenous contagion impacts of domestic industries. We find evidence that: (i) a constant exogenous impact from foreign industries appears in the risk premium for 5-year bonds issued by manufacturing industry firms, and (ii) contagion only exists from the manufacturing industry to the financial industry, and that there is no evidence of any reverse causation, even during the Lehman Brothers shock on September 15, 2008. Thus, in Japan, risk transfers from foreign industries to the domestic manufacturing industry, and thence to the domestic financial industry.

1. Introduction

Starting from its epicenter in the US subprime credit crisis, the ensuing global financial crisis (GFC) ultimately affected the international economy by spreading credit risk throughout the world. This paper investigates the risk contagion channel in order to suggest appropriate policy responses. We can classify previous studies in this area into two main groups. The first group includes studies that investigate contagion in other domestic markets, including those of Longstaff (2010) and Duchin et al. (2010). The second group comprises studies that investigate contagion effects in other countries. For example, Sugihara (2010) used equity returns, realized volatility, and volatility risk premiums (the difference between real volatility and risk-neutral volatility) to examine contagion effects in Japan, Germany, and the US. Elsewhere, Aloui et al. (2011) used Morgan Stanley Capital International (MSCI) indexes to investigate contagion in the Brazil, Russia, India, and China (BRIC) economies, while Baur (2012) employed a composite sector index of stock prices to examine contagion between developed and emerging countries. Lastly, Melvin and Taylor (2009) used exchange rates to evaluate contagion effects in the UK, EU, and Japan, and Kaabia et al. (2013) considered contagion arising from housing price effects across the OECD.

Within the second group of studies, several focus solely on contagion in Japan. For instance, Naifar (2011) used data on credit default swap (CDS) index spreads and found a regime switch from the noncrisis to crisis state. However, using real estate stock price indexes, Hatemi and Roca (2011) found no evidence of contagion from the US market into Japan. In other work, Morales and Andreosso-O'Callaghan (2012) used Nikkei 225 returns and a bivariate exponential generalized autoregressive conditional heteroscedasticity (2EGARCH) model and found that volatility spillovers from the US to Japan were identical in both the crisis and noncrisis periods, and therefore there was no evidence of

☆ The authors very much appreciate an anonymous referee's many useful comments. Earlier versions of this paper were presented at several seminars. The authors are grateful to Katsuto Iwai, Shinichi Fukuda, Yuzo Honda, Kazuo Ogawa, and Mamoru Nagano for their helpful comments. The first-named author acknowledges the financial support of a grant-in-aid (#23530367) from the Japanese Ministry of Education, Culture, Sports, Science and Technology and the Trust Companies Association of Japan in 2013.

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http://dx.doi.org/10.1016/j.japwor.2014.05.003
0922-1425/

contagion. Using risk premium data for the foreign and domestic financial and manufacturing industries and the 2EGARCH model, Miyakoshi et al. (2011) also found evidence of the direct contagion of foreign industry risk into the domestic financial and manufacturing industries in Japan, but no evidence of contagion among the domestic industries. Miyakoshi et al. (2011) also followed Baur (2012) in using sector indexes for each industry and found that the crisis directly affected both.

In this paper, we consider why most foreign countries rescued their respective financial industries, while the Japanese government rescued its manufacturing industry. The details of the Japanese government rescue package are as follows. To start with, the First Supplementary Budget for fiscal year (FY) 2009 for the General Account included an amount of 13,925 billion yen, consisting of expenditures for Measures for Employment, Financing for the Manufacturing Industry, Technical Progress, Infrastructure, etc.[1] This is the largest supplementary budget for the General Account on record. In stark contrast, the Deposit Insurance Corporation of Japan (DICJ) has no record of implementing financial assistance to the financial industry in FY2009.[2] Even more strangely, for FY1999, the DICJ implemented 20 cases of financial assistance, including monetary grants of 4,637 billion yen and asset purchases of 1,304 billion yen using the money financed by borrowings with and without government guarantee or by DICJ bonds with government guarantee.[3] Thus, following the GFC, the Japanese government mainly rescued its manufacturing industry. To find out why, we test for the presence of a risk contagion channel wherein risk transfers from foreign industries to the domestic manufacturing industry, after which the risk transfers to the domestic financial industry. That is, we identify the manufacturing industry as the entry point of risk inflow into Japan. Any findings for this particular risk contagion channel will then provide support for the large additional expenditures in the First Supplementary Budget for FY2009.

Miyakoshi et al. (2011) have already partially addressed this issue and found a risk contagion channel from the US to both the financial and manufacturing industries in Japan, therefore supporting the rescue policy set in place for the latter. Outlining the chronology of the Japanese crisis in detail, Miyakoshi et al. (2011, pp. 34–35 and p. 43) pointed out that Japan's exporting industry, including the Toyota, Honda, and Nissan motor vehicle companies, suffered extraordinary deficits in the two fiscal years following the crisis. In contrast, no major failures took place in the Japanese financial industry and the authors declared they were unable to find any evidence of the transmission of risk from the manufacturing industry to the financial industry in Japan. There is, however, shortcomings in their model as follow. The constant spillover assumption of the 2EGARCH model results in the estimation of average effects over the period of analysis. During Japan's Lost Decade (the long stagnation arising from the bursting of the domestic stock and real estate bubbles in 1990), a positive risk contagion from the financial industry to the manufacturing industry arose, whereas during the GFC, a positive risk contagion from the opposite direction came into being (see Miyakoshi and Tsukuda, 2004, 2007). While the Bank of Japan declared an end to the Lost Decade on July 13, 2006, its effects remained during the early phases of the GFC. Otherwise, the crisis revealed the positive effect of risk contagion, but a negative effect after the crisis had gone. Therefore, under a constant spillover assumption, the competing contagion effects appear to cancel each other out over the entire period, given it involves crisis and postcrisis periods. On this basis, Miyakoshi et al. (2011) suggested the use of a 2EGARCH model with time-varying coefficients and the Kalman filter methodology.

The purpose of this paper is to investigate the risk contagion channel of the GFC using daily data on bond risk premiums for Japan's financial and manufacturing industries from July 18, 2006 to May 25, 2010. We apply the 2EGARCH model with constant exogenous contagion effects from foreign industries and with a time-varying contagion effect on the endogenous domestic industries. A sector index accounting for a particular industry's risk and the time-varying parameters showing contagion switching are necessary from the viewpoint of dynamic risk contagion channels in Japan. We find evidence that: (i) a constant exogenous impact from foreign industries appears in the risk premium for 5-year bonds issued by manufacturing industry firms, and (ii) the time-varying endogenous contagion only exists from the manufacturing industry to the financial industry, and that there is no evidence of any reverse causation, even during the Lehman Brothers shock on September 15, 2008. Thus, in Japan, risk transfers from foreign industries to the domestic manufacturing industry, and thence to the domestic financial industry. This particular risk contagion channel may thus help explain why the Supplementary Budget for Japan in FY2008 included such historically large additional expenditures.

The remainder of the paper is organized as follows. Section 2 describes the data and the 2EGARCH model that allows the estimated coefficients to vary over time. Section 3 examines the risk contagion channels by comparing our results with those from previous studies. We also confirm the robustness of the results. Section 4 concludes the paper.

2. Data and methodology

2.1. Data

We first define and measure risk in the Japanese financial and manufacturing industries. We measure the risk (premium) for each bond using the yield spread against risk-free Japanese government bonds (JGB) of the same maturity, as follows.

Foreign country risk = AAA-rated Eurobonds denominated in Japanese yen and issued by a non-Japanese company outside of Japan – JGB.
Financial industry risk = interest rate swaps for financial industries in Japan – JGB.[4]
Manufacturing industry risk = a composite index of AA-rated bonds for the Japanese manufacturing industry (excluding telecommunications, utilities, and transportation) – JGB.

The daily yield data for the above are from Bloomberg. See Data Appendix for details. The sample period is from July 18, 2006 to May 25, 2010. We exclude the data from May 2010 to the present, because the European Sovereign Crisis commenced in May 2010 with Greece, Spain, Portugal, and Italy, which in turn dramatically affected the prices of JGB. Given we assume the JGB are a risk-free

[1] See the Ministry of Finance of Japan at http://www.mof.go.jp/budget/budger_workflow/budget/fy2009/sy210427/sy210427g.pdf (in Japanese). Unfortunately, there is no English language version available. Net expenditure represents the sum of the General Account and Special Account expenditures, less transfers in and out of the accounts for each policy field, putting aside the small amount for the Government-related Institutions Account. Accordingly, we focus on the General Account expenditure.

[2] See the DICJ at http://www.dic.go.jp/english/e_katsudo/e_shikinenjo/e_jisseki-nendo.html.

[3] See the DICJ at http://www.dic.go.jp/english/e_katsudo/e_shikinchotatsu/index.html.

[4] The swap buyer makes a fixed interest payment in exchange for a variable cash flow based upon the floating London interbank offer rate (LIBOR). The interest rate that determines the fixed payment is the swap rate. This rate thus includes the risk of the main counterparty, i.e., the financial industry.