Journal of Business and Economic Options

Exploring Model-Based Approaches to Contagion in Global Financial Markets: A Survey

Can Sever[a]

Abstract

The intensification of economic globalization has facilitated deeper cross-country linkages, serving as conduits through which country-specific shocks can transmit to affect financial conditions and macroeconomic variables across borders. This phenomenon has gained increased attention since the financial crises of the 1990s, with crisis propagation becoming a contentious issue in international finance. In the wake of the global financial crisis of the late 2000s, the concept of contagion has garnered considerable interest from both academia and policymakers alike. This survey aims to explore recent model-based approaches to understanding contagion in the realm of international finance. By examining the evolving literature on contagion, the survey seeks to shed light on the mechanisms, drivers, and implications of contagion effects in financial markets. One key area of focus in the survey is the identification of the channels through which contagion spreads across countries. These channels may include financial linkages such as cross-border capital flows, trade connections, and common exposures to systemic risks. Understanding these channels is essential for gauging the potential transmission of shocks and assessing vulnerabilities within the global financial system. Additionally, the survey aims to review various empirical methodologies and models employed to measure and quantify contagion effects. These methodologies may range from traditional event studies and correlation analyses to more sophisticated econometric techniques such as vector autoregression (VAR) models, structural VAR models, and dynamic factor models. By evaluating the strengths and limitations of these approaches, the survey seeks to provide insights into best practices for identifying and analyzing contagion phenomena. Furthermore, the survey delves into the drivers of contagion, including factors such as market sentiment, investor behavior, and policy responses. Understanding the behavioral dynamics that underlie contagion events is crucial for formulating effective policy responses and mitigating systemic risks. Lastly, the survey aims to assess the implications of contagion for financial stability, economic growth, and policy coordination. By examining the real-world consequences of contagion episodes, the survey seeks to inform policymakers and market participants about the potential spillover effects of financial crises and the importance of international cooperation in addressing contagion risks.

Keywords: Contagion, international finance, financial crises, globalization
JEL Codes: F3, G1, G2

1. INTRODUCTION

Cross-country linkages have become increasingly influential in transmitting and magnifying country-specific shocks, owing to the deepening integration of economies and financial markets on a global scale. The question arises: to what extent can these cross-country effects be characterized as contagion? Empirically, Forbes and Rigobon (2002) were among the first to differentiate between contagion and interdependence. They define contagion as "a significant increase in cross-market correlation during a period of turmoil." According to their framework, contagion manifests as a notable uptick in cross-market linkages, specifically correlation, following the occurrence of a shock in one country. In contrast, when a country-specific shock occurs without resulting in a fundamental shift in cross-country relationships, this phenomenon is classified as interdependence. In essence, the distinction lies in the magnitude and nature of the cross-country spillover effects observed in the aftermath of a shock. Contagion implies a heightened degree of interconnectedness and synchronization across markets, wherein disturbances in one country swiftly propagate to affect others. This contagion effect is characterized by increased cross-market correlation, reflecting the rapid transmission of shocks and the amplification of market turbulence.

On the other hand, interdependence suggests a more stable and resilient cross-country relationship, wherein shocks are absorbed without significantly altering the underlying linkages between markets. In this scenario, the occurrence of a country-specific shock may lead to some degree of spillover effects, but these effects are limited in scope and do not result in a substantial change in cross-market correlations. By distinguishing between contagion and interdependence, researchers and policymakers can better understand the dynamics of cross-country linkages and assess the potential implications for financial stability and market functioning. This nuanced understanding is essential for developing effective risk management strategies and policy responses to mitigate the adverse effects of financial contagion while fostering robust and resilient global financial markets.

[a] Department of Economics, University of Maryland, USA

Indeed, the definition of contagion holds significant implications, particularly in quantitative research, as it shapes the methodologies used to measure its occurrence. Several early theories shed light on different aspects of contagion in financial markets. Bikhchandani, Hirshleifer, and Welch (1992) present a model that conceptualizes mass behavior as a consequence of informational cascades. In their framework, individuals make decisions based not only on their private information but also on the actions and decisions of others. This leads to the propagation of beliefs and behaviors, creating cascades where individuals follow the actions of those before them, regardless of their private information. Banerjee (1992) explores the consequences of decisions that are influenced by the behaviors of others, particularly in the context of social interactions and conformity. His model highlights the role of social influence in shaping individual decisions and demonstrates how the actions of others can affect an individual's choices, leading to herding behavior and the spread of contagion. Gerlach and Smets (1996) present a different perspective, focusing on voluntary contagion in the context of currency devaluations. Their model considers the idea of competitive devaluations, where countries may choose to devalue their currencies in response to external economic conditions or policy actions by other countries. This voluntary contagion reflects strategic behavior among policymakers and can lead to a coordinated response that amplifies the effects of currency devaluations across multiple countries. These early theories provide valuable insights into the mechanisms underlying contagion in financial markets, highlighting the role of information dissemination, social influence, and strategic interactions among market participants and policymakers. By understanding these dynamics, researchers can develop more sophisticated models and empirical analyses to study and measure contagion accurately in financial markets.

The literature has dedicated a significant strand to examining the role of financial linkages in the transmission of shocks across countries. Kaminsky and Reinhart (2000) conducted an early investigation into the role of commercial banks in propagating initial shocks. Their study sought to understand how financial institutions, particularly commercial banks, contribute to the transmission of crises across borders. By analyzing the behavior of banks during periods of financial turmoil, Kaminsky and Reinhart shed light on the mechanisms through which crises can spread internationally via interconnected financial networks. In a similar vein, Van Rijckeghem and Weder (2001) delved into the concept of a common lender channel of contagion, particularly in the context of the Asian, Mexican, and Russian crises of the 1990s. Their study aimed to empirically test the significance of this channel in transmitting crises across different regions. By examining the behavior of common lenders across multiple crises episodes, Van Rijckeghem and Weder provided evidence supporting the importance of contagion through shared financial intermediaries. Calvo and Mendoza (2000) focused their attention on financial linkages characterized by imperfect information. Their study explored how imperfect information in financial markets can exacerbate the spread of crises across borders. By incorporating insights from information economics into their analysis, Calvo and Mendoza contributed to our understanding of the role of information asymmetries and market imperfections in amplifying the contagion effects of financial shocks. These early studies highlight the complex interplay between financial institutions, information asymmetries, and interconnectedness in driving the propagation of crises across countries. By elucidating the mechanisms through which financial linkages facilitate contagion, these studies provide valuable insights for policymakers and researchers seeking to mitigate the risks associated with cross-border financial spillovers.

2. RECENT MODELS OF CONTAGION

Lizarazo (2009) presents an early approach to understanding the dynamics of financial crises and contagion, particularly focusing on state-owned enterprises (SOEs) and their interactions with international investors. Building upon the framework proposed by Arellano (2008), Lizarazo develops a model that incorporates the endogenous default risk of SOEs, driven by country-specific fundamentals and the states of other countries in the international financial system. Contagion, as defined by Lizarazo, refers to the transmission of negative productivity shocks across economies that cannot be attributed to a common shock affecting multiple countries simultaneously. In her model, SOEs have access to international funds provided by risk-averse international investors, with lenders exhibiting decreasing absolute risk aversion in wealth. The key friction in the model arises from limited enforcement, whereby lenders cannot compel SOEs to repay their debt, and SOEs make decisions regarding default based on the costs and benefits associated with defaulting. The cost of default includes exclusion from the world asset market, leading investors to consider the default risk of SOEs when making lending decisions. Lizarazo's model identifies two channels through which contagion can occur: the wealth channel and the portfolio recomposition channel. In the wealth channel, if an SOE faces an income shock and defaults, investors' tolerance for risk decreases due to the loss in wealth, prompting them to reallocate their assets from risky investments to risk-free assets. This results in a decline in funds available for other SOEs that have not experienced shocks initially. The portfolio recomposition channel operates through changes in the overall risk of the investor's portfolio following an increase in default risk in an SOE. Depending on the degree of risk aversion, investors may either seek safer investments or reallocate their portfolio to other countries with less significant increases in risk. The interplay between these forces determines whether contagion occurs, with the potential for a "flight to safety" effect or increased investment in certain countries. Overall, Lizarazo's model provides insights into the mechanisms underlying contagion in financial crises, highlighting the role of investor behavior and risk attitudes in shaping cross-border financial linkages. The empirical results of the model are consistent with observations from emerging market data, underscoring the relevance of the proposed framework in understanding real-world contagion dynamics.

Mendoza (2010) contributes significantly to financial crisis literature by exploring the amplifying effects of borrowing constraints, particularly in the context of sudden stop events in a model focusing on state-owned enterprises (SOEs). While

Mendoza's study does not explicitly frame itself as a contagion model, its foundational principles have been instrumental in shaping contagion literature. At the core of Mendoza's model are several key components, including working capital constraints, endogenous collateral-constrained borrowing, and the role of imported goods in production. The model introduces an occasionally binding collateral constraint, which is endogenous in two dimensions and serves to explain business cycle asymmetries during sudden stop events. The occasionally binding collateral constraint stipulates that the value of asset holdings net of borrowing due to working capital must be greater than or equal to the marked-to-market value of capital scaled by a constant. This constraint plays a crucial role in amplifying the effects of shocks, particularly during sudden stops. During a sudden stop event, the constraint may bind, triggering a debt-deflation mechanism. When the constraint binds, agents reduce their demand for equity, leading to a decline in the price of equity. Additionally, since imported goods are essential for production and the amount firms borrow for working capital factors into the collateral constraint, firms may struggle to purchase enough input for production when the constraint binds, leading to a decrease in production. Furthermore, the marginal product of capital increases in labor and the imported input. As a result, when the constraint binds, there is a decline in the marginal product of capital, leading to a further decrease in the price of capital and exacerbating the debt-deflation dynamics. Importantly, Mendoza demonstrates that sudden stop events can occur due to small shocks originating from the rest of the world, even in the absence of direct links between countries. This aspect of the model suggests that contagion can manifest as sudden stop events affecting multiple countries in response to a trigger shock, highlighting the interconnectedness of the global financial system and the potential for spillover effects across borders.

Ozkan and Unsal (2012) present a two-country dynamic stochastic general equilibrium (DSGE) model aimed at investigating contagion dynamics, particularly from the perspective of a state-owned enterprise (SOE). Notably, their model introduces an innovative feature by considering two countries with differing population sizes, thus allowing for potential interactions between the two countries—a departure from existing SOE and fully symmetric models of contagion. The contagion mechanism in their model stems from financial frictions in the rest of the world, reflecting the effects of recent crises on emerging markets. They identify two primary effects of these crises on emerging markets: a slowdown in financial flows and a significant decline in exports due to contractions in other economies, despite currency devaluations in some emerging countries. Their model incorporates three key features to capture these dynamics. First, a substantial portion of domestic investment is financed by foreign investors, indicating high leverage. Second, borrowing by emerging markets is denominated in foreign currency terms, reflecting foreign currency denominated debt. Third, the model allows for an investigation of exchange rate pass-through effects, with Rotemberg (1982) price stickiness considered. The re-pricing of credit risk, resulting from financial frictions in the rest of the world, increases the cost of external borrowing, leading to a decline in inflation and output in the domestic economy alongside currency depreciation. In response, firms reduce borrowing to alleviate leverage. However, the decrease in inflation and currency depreciation also increases the real debt burden, contributing to a reduction in consumption. When a crisis originates domestically, currency depreciation partially offsets the decline in consumption and investment. Conversely, if the shock is transmitted from abroad, the export channel operates in the opposite direction, exacerbating the decline in investment and consumption. Empirical evidence from various studies underscores the role of the trade channel in contagion, providing support for the theoretical framework proposed by Ozkan and Unsal (2012).

Eichengreen et al. (1996) conducted one of the early studies on contagion, estimating a probit model for 20 developed countries. Their definition of contagion centers on a crisis in one country increasing the probability of a crisis occurring in other countries. In their analysis, they discern between different channels of transmission and find the trade-weighted measure to be significant in crisis propagation. Similarly, Ozkan and Unsal (2012) also delve into the impact of trade integration on contagion dynamics. They observe that greater trade integration leads to a heightened response of macroeconomic variables to sudden stops of capital inflows, as changes in exports have a more pronounced impact for these countries. Through monetary policy experiments, they conclude that the effectiveness of two types of policies depends on the degrees of contagion, trade openness, and foreign currency denominated debt. These findings highlight the interconnectedness of economies and the importance of considering trade integration in understanding contagion dynamics. Moreover, they underscore the necessity for policymakers to tailor their responses to crises based on the specific characteristics of their economies, including trade openness and exposure to foreign currency denominated debt.

Mendoza and Quadrini (2010) present a comprehensive 2-country model that builds on the foundations laid by Mendoza et al. (2009), particularly focusing on global imbalances and financial development. By analyzing empirical data, they ascertain the significant role of financial globalization in recent crises, particularly in the context of the United States. Their paper seeks to elucidate various aspects of the crisis using a model that incorporates heterogeneous financial development across countries, the effects of price shocks, and contagion dynamics. The model posits that financial integration prompts an increase in credit in the most financially developed country, leading to substantial asset price spillovers when country-specific shocks affect bank capital. These shocks are further amplified by bank capital requirements based on mark-to-market valuations. Unlike Mendoza et al. (2009), Mendoza and Quadrini (2010) focus on unanticipated shocks that impact the net worth of financial intermediaries. They model market incompleteness using limited enforcement mechanisms, wherein countries with better enforcement systems exhibit lower propensities to save, resulting in negative net foreign assets. In their model, even a relatively minor shock to the equity of financial intermediaries can trigger significant fluctuations in asset prices, with recovery taking an extended period. The resulting changes in asset prices serve as the source of contagion. A pivotal aspect of their analysis involves a policy experiment examining capital requirements. They find that changing the capital requirement

rule from mark-to-market to a system based on historical prices mitigates the impact of shocks on asset prices, effectively reducing the potency of the Fisherian-deflation channel.

Dedola and Lombardo (2012) present a rigorous 2-country model aimed at investigating the impact of leveraged international investors on shock transmission. They address the discussion surrounding the recent financial crisis, particularly focusing on the international exposure of highly leveraged investors' balance sheets to toxic US assets. Despite mixed empirical evidence on the direct exposure of balance sheets to explain contagion, the authors propose an alternative mechanism for crisis propagation, namely price equalization through the no-arbitrage condition. In their model, asymmetric shocks, such as credit spread shocks to a specific country, lead to synchronization of credit spreads and borrowing costs across countries. This synchronization occurs due to the financial frictions present in the domestic financial markets, where investors are constrained to borrow only domestically at a spread over the risk-free rate. The no-arbitrage condition ensures that credit spreads are equalized globally, regardless of the degree of balance sheet exposure of highly leveraged investors. Incorporating this mechanism into a 2-country DSGE model results in strong comovements of credit spreads and weak comovements of GDP across countries following country-specific productivity shocks. However, financial shocks induce strong comovements in both credit spreads and GDP. This model sheds light on the optimal degree of financial integration in the presence of domestic financial market frictions, suggesting that integration can be welfare-improving by providing insurance against idiosyncratic risks. Key components of the model include Calvo (1983) price rigidity for producers, endogenous portfolio choice for investors, and a collateral constraint similar to that proposed by Mendoza (2010). Overall, the model highlights how a high degree of financial integration can lead to cross-country equalization of external finance premia faced by levered investors, thereby facilitating a global flight to quality mechanism and explaining linkages in macroeconomic variables and leverage across countries.

Kalemli-Ozcan et al. (2013) employ the working capital constraint as a channel of contagion within a two-country general equilibrium framework. Their empirical findings suggest that financial crises lead to increased comovements across countries, particularly noting that countries with stronger financial linkages to the US experienced more synchronized cycles during the recent financial crisis. To explain these observations, they propose a dynamic stochastic general equilibrium (DSGE) model featuring international banking and investigate the impact of both productivity and financial shocks. In their model, they explore how exogenous changes in financial integration affect business cycle comovements, considering the presence of both productivity and financial shocks. The structure of their model aligns with empirical findings, revealing a relationship between business cycle comovements and financial integration. Specifically, they observe that in normal times, greater financial integration reduces comovement, while during crises, the two are positively correlated. The model operates in a two-sector, one-good world, where sectors are financially isolated and integrated with exogenous fractions $\{1-\lambda, \lambda\}$, representing the degree of financial integration. They differentiate between lending and deposit rates of the banking sector, introducing a wedge between the two rates due to potential gains or losses on risky investments by banks. This wedge arises from the fact that banks may profit or incur losses on investments in risky projects, even if their overall profits are zero. Consequently, banks adjust interest rates charged to firms in response to negative shocks to risky assets, transmitting idiosyncratic credit shocks from one country to the bank and subsequently impacting the real economies of both countries via working capital.

Devereux and Yu (2014) explore the tradeoff stemming from financial integration in a two-country symmetric general equilibrium (GE) model, drawing on Mendoza (2010) type collateral constraints as a pivotal component. Their analysis centers on two channels: risk sharing, involving the diversification of risk, and contagion, concerning the transmission of crises. In their model, they introduce endogenous world interest rates, asset prices, capital flows, and portfolio choices. Each country comprises investors (firms), savers (workers), and a global banker (in the case of integration). They examine the effects of three levels of financial integration on risk-taking, leverage levels, the probability, contagion, and severity of crises. A crisis in country j is defined as a state in which collateral constraints are binding in that country. Contagion occurs when these constraints bind in both countries. Financial integration amplifies investors' leverage and risk-taking, thereby increasing global credit availability, the value of existing assets, collateral values of investors, and borrowing capacity. Additionally, integration decreases consumption risk, leading to a reduction in precautionary savings. The model reveals a tradeoff arising from integration: while financial integration makes crises more likely, they tend to be less severe. A crucial aspect of their calibration is the introduction of rare disasters into the autoregressive (AR) process of productivity shocks. Similar to Mendoza (2010), the collateral constraint is occasionally binding in a stochastic environment due to precautionary saving, which serves as a form of self-insurance against future low realizations. This feature is essential for explaining the Fisherian-deflation mechanism (fire sales) and the asymmetric effects of integration depending on the financial situation of each country. Devereux and Yu's model offers insights into the dynamics of financial integration, emphasizing the complex interplay between risk-sharing and contagion effects and highlighting the importance of collateral constraints in shaping crisis outcomes.

The model proposed by Devereux and Yu (2014) diverges from Perri and Quadrini (2011) in two key aspects. Firstly, it incorporates endogenous portfolio choice, and secondly, it introduces imperfect risk-sharing among investors across borders. In contrast, the assumption that the objective function of the global banker includes workers' utility leads to perfect risk-sharing between workers of the two countries at all levels of integration. Moreover, Devereux and Yu's model introduces a fire sale mechanism, adding endogenous price adjustments alongside the quantity channel of Perri and Quadrini (2011). Furthermore, while Kalemli-Ozcan et al. (2013) focus on the working capital as the transmission channel, Devereux and Yu's

model emphasizes the role of investors' balance sheets. Unlike Mendoza and Quadrini (2010), which deals with idiosyncratic uncertainty, Devereux and Yu (2014) incorporate aggregate uncertainty and investigate how financial integration affects crisis probability. Additionally, Mendoza and Smith (2006) study a small economy, while Devereux and Yu's model operates within a symmetric GE framework. The findings of Devereux and Yu (2014) align with various strands of literature. Some studies have found a positive relationship between financial liberalization and the risk of crisis, while others have identified high leverage levels following financial integration. Furthermore, there is evidence supporting a positive relationship between capital flows and credit build-up. Finally, another strand of the literature suggests that financial integration may lead to more frequent but less severe crises, as it can act as a buffer or insurer of last resort.

Garleanu et al. (2014) present a groundbreaking contribution by introducing costly participation in financial markets. In their model, investors and firms are positioned on a circle, and gaining access to credit incurs a cost related to distance. This framework allows them to delve into various aspects of asset price determination, optimal investment strategies (such as leverage, participation, and risky asset position decisions), and contagion dynamics. Despite having ex-ante identical investors, their decisions diverge ex-post due to endogenous choices. Particularly, investments with high leverage are highly sensitive to changes in access costs, leading to discontinuous price drops, de-leveraging, and reversals in portfolio flows. Additionally, shocks originating from a subset of locations reverberate throughout the entire market, serving as a channel for contagion. Limited market integration exacerbates investors' vulnerability to shocks near their location, resulting in higher risk premia compared to a frictionless world. Notably, the decision to participate in markets plays a crucial role in the model. Increased participation incentivizes higher leverage, amplifying the effects of negative shocks in the market. One of the model's key contributions is its ability to generate contagion even in the absence of agents participating in all markets. Contrary to conventional wisdom, the study finds that contagion stems from limited rather than excessive integration. Moreover, contagion from local shocks has more significant effects when market integration is more restricted. The model highlights how small changes in participation costs can lead to substantial fluctuations in leverage and prices due to collateral constraints.

Glover and Shubik (2012) present a pioneering approach by developing a network model to analyze international lending and borrowing within a framework of a Single Open Economy (SOE). Unlike much of the existing literature, which tends to focus on contagion effects in isolation, their model considers how the default of one sovereign entity can impact others within the network. One of the pivotal features of their model is the endogenous formation of the network. They examine how a sovereign default affects borrowing costs and default probabilities of other countries in the network. In their framework, default by a representative household is defined as debt exceeding revenue, with this definition extended to the country as a whole due to the representative nature of the household. The choice of loans for a country is contingent upon the solvency probability of potential borrowers, leading to the endogenous construction of lending-borrowing links. By utilizing data on cross-holdings of sovereign debt, they estimate the network model and observe a significant role for direct contagion effects stemming from a sovereign default. In essence, Glover and Shubik's network model sheds light on the intricate interplay between sovereign defaults and cross-country linkages, providing valuable insights into the dynamics of contagion in international lending and borrowing scenarios.

3. CONCLUSIONS

The study of contagion in international finance presents numerous avenues for further exploration and research. Policy questions are particularly salient, as various policy decisions, including banking regulation, trade policies, exchange rate regimes, and government borrowing decisions, can significantly influence the dynamics of contagion. Understanding the negative externalities stemming from investors' decisions is also crucial for developing effective policy responses. One area that remains relatively unexplored is the identification of leading indicators of contagion. Investigating signals or early warning signs of contagion could greatly enhance our ability to anticipate and mitigate its effects. Moreover, while financial intermediation is often simplified in existing models, given its central role in recent crises, there is a pressing need for more sophisticated and realistic modeling of the intermediation sector. This includes incorporating off-balance sheet items, which have played a notable role in recent financial crises. Another promising direction for research involves incorporating collateral assets with varying qualities or shocks to these assets into contagion models. Such enhancements could provide deeper insights into the mechanisms driving contagion dynamics. Indeed, the study of contagion in international finance presents numerous avenues for further exploration and research. While financial and trade linkages are commonly acknowledged as important channels of contagion, there is still room for exploring asymmetric effects and amplification during crises, particularly through the lens of collateral constraints. Models that integrate these constraints may offer a more nuanced understanding of contagion dynamics and their impact on real macroeconomic variables. Moreover, the literature on contagion is evolving, with models becoming increasingly sophisticated and comprehensive. By addressing more aspects of contagion and exploring new questions, researchers can contribute to a deeper understanding of this complex phenomenon. This deeper understanding, in turn, can inform more effective policy responses aimed at mitigating the risks and consequences of contagion in the global financial system. As researchers continue to delve into the intricacies of contagion, they pave the way for more robust policy frameworks and strategies to safeguard financial stability and promote economic resilience.

REFERENCES

Almunia, M. (2010). From great depression to great credit crisis: similarities, differences and lessons. *Economic policy*, 25(62), 219-265.

Arellano, C. (2008). Default risk and income fluctuations in emerging economies. *The American Economic Review*, 690-712.

Banerjee, A. V. (1992). A simple model of herd behavior. *The Quarterly Journal of Economics*, 797-817.

Bekaert, G. (2011). Global crises and equity market contagion. No. w17121. *National Bureau of Economic Research*.

Bikhchandani, S. David, H. and Ivo, W. (1992). A theory of fads, fashion, custom, and cultural change as informational cascades. *Journal of political Economy*, 992-1026.

Borio, C. E. V. and Piti, D. (2011). Global imbalances and the financial crisis: Link or no link?

Bordo, M. (2001). Is the crisis problem growing more severe? *Economic policy*, 16(32), 51-82.

Calderon, C. and Megumi, K. (2012). Gross inflows gone wild: gross capital inflows, credit booms and crises. *World Bank Policy Research Working Paper*, 62-70.

Calvo, G. A. (1983). Staggered prices in a utility-maximizing framework. *Journal of monetary Economics*, 12(3), 383-398.

Calvo, G. A. and Enrique, G. M. (2000). Rational contagion and the globalization of securities markets. *Journal of international economics*, 51(1), 79-113.

Dedola, L. and Giovanni, L. (2012). Financial frictions, financial integration and the international propagation of shocks. *Economic Policy*, 27(70), 319-359.

Demirgüç-Kunt, A. and Enrica, D. (1998). Financial liberalization and financial fragility. 1-36.

Devereux, M. B. and James, Y. (2010). Leverage constraints and the international transmission of shocks. Journal of Money, Credit and Banking, 42(s1), 71-105.

Devereux, M. B. and Changhua, Y. (2014). International financial integration and crisis contagion. No. w20526. National Bureau of Economic Research.

Eichengreen, B. Andrew, K. R. and Charles, W. (1996). Contagious currency crises. No. w5681. National Bureau of Economic Research.

Forbes, K. J. and Roberto, R. (2002). No contagion, only interdependence: measuring stock market co-movements. *The journal of finance*, 57(5), 2223-2261.

Gerlach, S. and Franks, S. (1996). MCIs and monetary policy in small open economies under floating rates. Manuscript, Bank of International Settlements .

Glover, B. and Seth, R. (2012). Sovereign debt crises and international financial contagion: Estimating effects in an endogenous network. Working Paper.

Imbs, J. (2004). Trade, finance, specialization, and synchronization. *Review of Economics and Statistics*, 86(3), 723-734.

Gârleanu, N. Stavros, P. and Jianfeng, Y. (2013). Financial entanglement: A theory of incomplete integration, leverage, crashes, and contagion. No. w19381. National Bureau of Economic Research.

He, Z. and Arvind, K. (2014). A macroeconomic framework for quantifying systemic risk. No. w19885. National Bureau of Economic Research.

Kalemli-Ozcan, S. Elias, P. and Fabrizio, P. (2013). Global banks and crisis transmission. *Journal of International Economics*, 89(2), 495-510.

Kamin, S. B. and Laurie, P. D. (2012). How did a domestic housing slump turn into a global financial crisis? *Journal of international money and finance*, 31(1), 10-41.

Kaminsky, G. L. and Carmen, M. R. (2000). On crises, contagion, and confusion. *Journal of international Economics*, 51(1), 145-168.

Krugman, P. (2008). *The international finance multiplier*.

Lane, P. R. (2013). Financial globalization and the crisis. *Open Economies Review*, 24(3), 555-580.

Lane, P. R. and Peter, M. (2014). Domestic Credit Growth and International Capital Flows. *The Scandinavian Journal of Economics*, 116(1), 218-252.

Lizarazo, S. (2009). Contagion of financial crises in sovereign debt markets.

Mendoza, E. G. (2010). Sudden stops, financial crises, and leverage. *The American Economic Review*, 100(5), 1941-1966.

Mendoza, E. G. and Vincenzo, Q. (2010). Financial globalization, financial crises and contagion. *Journal of Monetary Economics*, 57(1), 24-39.

Mendoza, E. G. Vincenzo, Q. and José-Victor, R. (2009). On the welfare implications of financial globalization without financial development. NBER International Seminar on Macroeconomics 2007. University of Chicago Press.

Mendoza, E. G. and Katherine, A. S. (2006). Quantitative implications of a debt-deflation theory of Sudden Stops and asset prices. *Journal of International Economics*, 70(1), 82-114.

Moser, T. (2003). What is international financial contagion? *International Finance*, 6(2), 157-178.

Neumeyer, P. A. and Fabrizio, P. (2005). Business cycles in emerging economies: the role of interest rates. *Journal of monetary Economics*, 52(2), 345-380.

Ozkan, F. G. and Filiz, U. (2012). Global financial crisis, financial contagion, and emerging markets.

Pericoli, M. and Sbracia, M. (2001). A Primer on Financial Contagion. Temi di discussione (Economic Working Papers) 407. Bank of Italy." Economic Research Department.

Perri, F. and Vincenzo, Q. (2011). *International recessions*. No. w17201. National Bureau of Economic Research.

Reinhart, C. M. and Kenneth, R. (2009). This time is different: eight centuries of financial folly. Princeton university press.
Rotemberg, J. J. (1996). Prices, output, and hours: an empirical analysis based on a sticky price model. *Journal of Monetary Economics*, 37(3), 505-533.
Van, R. C. and Beatrice, W. (2001). Sources of contagion: is it finance or trade? *Journal of International Economics*, 54(2), 293-308.