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FINANCIAL INSTABILITY AND SHADOW BANKING RELATIONSHIP: THE CASE OF THE UNITED STATES OF AMERICA

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Abstract

The impact of shadow banking on financial stability remains a controversial issue today due to the size and complexity of these activities and the inadequate regulatory frameworks for systemic risks. In this context, shadow banking has become the focus of financial regulators due to its potential effects on financial stability. Therefore, this study was conducted to understand the impact of shadow banking on financial stability. In this study, the relationship between shadow banking and financial instability is examined using the VAR method for the example of the United States, covering the period 2000-2020. In order to create an accurate model, firstly unit root tests were performed, followed by autocorrelation and heteroscedasticity tests. The findings were found to be significant and Johansen cointegration test was applied. In the cointegration results, it was seen that the series were cointegrated, that is, they moved together in the long run. Finally, a Granger causality test was conducted between shadow banking and financial instability, and according to the empirical findings, it was concluded that there was a causality from shadow banking to financial instability for the period in question.

Keywords: *Financial Instability, Shadow Banking, VAR*
JEL Classification: *E40, E44, G23*

FİNANSAL İSTİKRARSIZLIK VE GÖLGE BANKACILIK İLİŞKİSİ: AMERİKA BİRLEŞİK DEVLETLERİ ÖRNEĞİ

Öz

Gölge bankacılığın finansal istikrar üzerindeki etkisi, bu faaliyetlerin boyutu ve karmaşıklığı ile sistemik risklere yönelik düzenleyici çerçevelerin yetersiz olması nedeniyle günümüzde hala tartışmalı bir konu olarak karşımızda durmaktadır. Bu bağlamda gölge bankacılık, finansal istikrar üzerindeki potansiyel etkileri nedeniyle finansal düzenleyicilerin odak noktası haline gelmiştir. Bu nedenle bu çalışma, gölge bankacılığın finansal istikrar üzerindeki etkisini anlamak amacıyla yapılmıştır. Bu çalışmada, gölge bankacılık ile finansal istikrarsızlık arasındaki ilişki, 2000-2020 dönemini kapsayan, Amerika Birleşik Devletleri örneği için VAR yöntemi kullanılarak incelenmektedir. Doğru bir model oluşturabilmek için öncelikle birim kök testleri yapılmış ardından otokorelasyon ve değişen varyans testleri yapılmıştır. Elde edilen bulgular anlamlı bulunarak Johansen eşbütünleşme testi uygulanmıştır. Eşbütünleşme sonuçlarında serilerin eşbütünleşik olduğu yani uzun dönemde birlikte hareket ettiği görülmüştür. Son olarak gölge bankacılık ile finansal istikrarsızlık arasında Granger nedensellik testi yapılmış ve elde edilen ampirik bulgulara göre söz konusu dönem için gölge bankacılıktan finansal istikrarsızlığa doğru bir nedensellik bulunduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler: *Finansal İstikrarsızlık, Gölge Bakacılık, VAR*
JEL Sınıflandırması: *E40, E44, G23*

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1. Introduction

The term shadow banking is not a novel. Economist McCulley first mentioned the term "Shadow Bank" at a conference he attended in 2007. At this conference, McCulley provided a definition of shadow banking as non-bank institutions that primarily involve themselves in maturity transformation (Okur, 2020). Shadow banking lacks a single clear-cut definition. Krugman (2009) describes shadow banks as financial intermediaries that leverage large amounts of securities and complex financial instruments.

Pozsan et al. (2012) define shadow banking as intermediary institutions that undertake maturity, credit, and liquidity transformations without access to central bank liquidity and public sector credit guarantees. According to Claessens (2014), shadow banking encompasses all financial activities that necessitate either private or public payment guarantees, other than those in the realm of traditional banking.

The Financial Stability Board, which has been publishing periodic reports on this subject since 2022, defines shadow banking as credit institutions that perform activities outside of the conventional banking system. Shadow banking has arisen as a result of the speeding up of financial innovations, technological advancements and regulatory deficiencies. This sector presents benefits, such as high returns, low costs and quick transaction times, which are not available with traditional banks.

Shadow banking has experienced significant growth in recent years, offering financial instruments similar to the traditional banking sector. However, the operations of these institutions often deviate from the structure of traditional banks and are subject to less regulation by regulatory authorities.

Although shadow banking does not replace traditional banks, it functions as a complement to them and provides services in areas where traditional banks are insufficient or non-existent. For instance, hedge funds, private equity funds, and other financial institutions which offer high-risk, high-return investment opportunities not provided by traditional banks are involved in the shadow banking sector.

Shadow banking has emerged as a significant concern in the financial industry in recent times. These unconventional fiscal instruments operate outside the customary banking systems, substituting bank funds, but delivering comparable services that run the risk of destabilising the financial framework.

The exemption of shadow banking financial instruments from direct regulatory oversight and their tendency to mainly include high-risk investments constitutes the primary reasons for this threat. The shadow banking sector assumes a significant role during financial crises. During the global financial crisis of 2007-2008, the shadow banking sector resulted in financial instability caused by high-risk investments and credit risk transfer transactions in the mortgage market. Consequently, regulatory authorities have implemented more stringent regulations on the shadow banking sector in order to reduce its impact on the financial system.

The impact of shadow banking on financial stability is a contentious issue because of the magnitude and intricacy of these activities and the insufficient regulatory frameworks to tackle systemic risks. Consequently, the potential effects of shadow banking on financial stability have become the primary focus of financial regulators. Hence, comprehending the effect of shadow banking on financial stability and developing relevant regulatory frameworks is crucial. To guarantee financial stability, it is important to supervise and govern shadow banking activities. Research on the topic reveals that shadow banking is a key contributor to the formation and spread of financial crises. Consequently, regulations and audit mechanisms must be established to enhance the safety of financial systems. This study seeks to offer a more comprehensive understanding of the matter by examining the impacts of shadow banking on financial stability.

The study consists of five sections. After general information about shadow banking is given in the introduction section, the literature is examined in the second section. The third section provides information about the methods and data used in the study. Afterwards, the empirical findings obtained are conveyed to the reader. In the fifth chapter, the findings are evaluated and policy recommendations are discussed.

2. Literature Review

Numerous researchers posit that shadow banking activities may exacerbate financial instability. In contrast to credit rating agencies, shadow banking institutions are subject to less regulation and often carry high-risk assets in their portfolios. As a result, shadow banks tend to engage in greater risk-taking behaviours than traditional banks. This could pose a significant risk to financial stability.

Another crucial factor is that shadow banks have the potential to trigger financial crises by injecting liquidity into the financial system. Shadow banks lure investors with higher interest rates as compared to lower interest rates, and many investors are ready to take risks in the expectation of higher returns through investing in shadow banks. However, shadow banks may encounter payment challenges if investors seek to transform their assets into liquid holdings. This suggests that shadow banks may not be able to extend liquidity to the financial system and could prompt financial crises.

Longworth (2012) argues that the shadow banking system operates efficiently during normal periods, resulting in financial innovation and reduced borrowing costs, with few institutional or divisional failures. However, during times of stress, such as the financial crisis, it can significantly exacerbate financial instability.

Bengtsson (2013) investigated the correlation between shadow banking and financial instability via transmission mechanism channels. His findings revealed that financial instability can transmit from the money market funds (MMF) sector to the wider financial system through transmission mechanism channels.

Borst (2013) asserted that in light of insufficient progress in financial sector reform and stronger prudential regulation, shadow deposits in China will persist in their growth as a prospective instigator of financial instability.

Zou et al. (2013) conducted an empirical analysis which indicates that the excessive expansion of shadow banking results in heightened financial instability.

Huang (2015) contends that shadow banking enhances financial instability, as market discipline tightening during economic downturns obliges shadow banks to sell their assets cheaply to regular banks.

Moosa (2015) contends that a significant issue with securitisation lies in the potential for fraudulent practices in shadow banking activities, resulting in financial instability. This concern highlights the importance of addressing the risks inherent in this field of activity.

Bryan et al. (2016) propose that the significance of shadow banking in the long-term extends beyond its involvement in the financial crisis, as well as tax and regulatory arbitrage.

Liang's (2016) analysis demonstrates an escalation in financial risks due to the swift and extensive expansion of shadow banks' loans. Nevertheless, he posits that these hazards are containable, and the potentiality for systemic financial instability can be mitigated.

Sieron (2016) asserts that the collateral utilised in the shadow banking procedure is not tantamount to money and its reutilisation could foster economic instability.

Diallo and Al-Mansour's (2017) research indicates that the insurance industry and financial stability have a significant negative correlation. Furthermore, utilising the shadow banking system

as a channel will have an adverse effect on the financial stability of the insurance sector, especially in countries with high levels of shadow banking assets.

Shih (2017) contends that although shadow credit is sizable, there is unlikely to be an explosive growth of shadow finance as long as liquidity from the banking sector continues to flow. Nevertheless, the scale of shadow financing is enormous, and miscalculations by the PBOC could cause momentary panic.

Huang (2018) contends that shadow banking heightens internal risk and is cyclical. Tightening banking regulations increases the borrowing capacity of shadow banking and contributes to its financial instability. Huang's findings reveal that limited aggregate risk sharing does not enhance financial stability in the presence of shadow banking.

Ilesanmi and Tewari (2019) examine the relationship between shadow banking and financial stability in South Africa using a literature review approach. The authors argue that the continued growth of the shadow banking system has serious policy implications for regulators, stakeholders and the stability of the financial system, and that this may lead to a situation where we have assets, funds and investment managers that are "too big to fail", just as was the case in the traditional banking sector before the 2007/08 crisis, and that shadow banking should be kept under control.

Schneider (2022) conducted a study on the systemic risk of the corporate bond market associated with the surge of shadow banking since 2008 in the context of Hyman Minsky's financial instability theory. The research concludes that financial instability is caused by shadow banking, thus supporting the view that shadow banking should be regulated.

The studies examined generally reveal that shadow banking disrupts financial stability. The common aspect of this study with the above studies is the subject. The study is different from other studies in terms of the country, period or method. The results obtained from the study are compared with the results in the literature in the last part of the study.

3. Data and Methodology

Since 2002, the Financial Stability Board has been consistently publishing an annual report on Shadow Banking involving 30 countries. Our focus for this study was on the United States, and we examined the period between 2002-2020. The major justification for this is due to unavailability of data for other variables used in this study across all countries, coupled with the United States having the highest volume of Shadow Banking.

In this study, the banking crisis index was utilised as a substitute for the financial instability index. Nonetheless, ascertaining the real-time banking crisis is highly challenging, and so Batuo et al. (2018) employed the principal component analysis (PCA) technique.

To apply this method, correlated variables were transformed into uncorrelated (principal components) variables. The first component considers the maximum variance and the second component estimates the maximum variance of variables not taken into account by the first component.

Batuo et al. (2018) studies, three criteria were considered to calculate the financial instability index. These are the change in the real interest rate (dint), the change in the GDP share of domestic loans given to the private sector (dcrdt) and the change in the GDP share of broad money supply (M2) (dm2). The annual financial instability index for the United States was calculated using the principal component analysis method. The results obtained are shown in Table 1:

Table 1**: Principal Component Analysis For Instability Index**

Variable	Eigenvalues	Variance	Comp Loading
Interest Rate	1.27	0.49	0.46
Credit	0.22	0.42	0.78
Liquidity Ratio	1.49	0.07	0.41

Since the largest eigenvalue corresponds to the first variable, this variable plays a critical role in explaining changes in the data. According to the results of the last column in Table 1, the shadow banking index is:

$$\text{instabl} = (0.46 \text{ x lint}) + (0.78 \text{ x lcrdt}) + (0.41 \text{ x lm2}) \quad (1)$$

Table 2 below shows us the variables used in the study, the symbols of these variables and the sources from which they were obtained.

The variables that determine the financial instability index are: The change in the real interest rate, the change in the GDP share of domestic loans given to the private sector, and the change in the GDP share of broad money supply (M2). Table (2) above provides information about the variables used in this study.

Table 2: **Variable Definitions**

Variable	Unit	Symbol	Defination	Source
Financial Instability	-	instabl	The Financial Instability Index is composed of three factors: changes in interest rates, changes in domestic credit to the private sector, and changes in the ratio of money to GDP.	Research calculation
Shadow Banking	Percent	shadow	Ratio of shadow banking assets to total financial assets	FSB
Change in GDP	Percent	gdp	Percent change in real GDP compared to the previous period	World bank
Change in M2 M2 Değişim	Percent	m2	Percentage change in liquidity compared to the previous year	World bank
Change in the share of domestic credits extended to the private sector in GDP	Percent	crdt	Domestic credit to the private sector (GDP ratio)	World bank

The study utilised the vector autoregression (VAR) model, pioneered by Granger (1980), which is built upon the Granger causality test model. The VAR model considers two endogenous variables and associates them with their mutually lagged values for a certain duration. The status of internal and external variables in the structural model is criticised by Sims.

The study utilised the vector autoregression (VAR) model, pioneered by Granger (1980), which is built upon the Granger causality test model. The VAR model considers two endogenous variables and associates them with their mutually lagged values for a certain duration. Sims critiques the use of internal and external variables in the structural model and argues that this approach is unnatural. When taking into account the Yt and Xt series, the VAR model can be defined as follows (Ertek, 2020):

$$Y_t = \alpha + \sum_{j=1}^{m} \beta_t Y_{t-j} + \sum_{j=1}^{m} \delta_j X_{t-j} + \varepsilon_{1t} \quad (2)$$

$$X_t = \alpha + \sum_{j=1}^{m} \theta_j Y_{t-j} + \sum_{j=1}^{m} \vartheta_j X_{t-j} + \varepsilon_{2t} \quad (3)$$

Here ε_{1t} and ε_{2t} represent the error terms. In the model, the lagged values of the Y variable affect the X variable, and the lagged values of the X variable affect the Y variable. Since there are only lagged variables on the right side of the equations in this model, the values found by the least squares method will be consistent (Okur, Yılmaz; 2022)

4. Empirical Findings

ADF test results for the series analysed in this study can be found in Table 3. The table uses the abbreviations instabl, shadow, gdp, m2, and crdt to represent financial instability, shadow banking

assets, economic growth, money supply, and domestic loans to the private sector, respectively. The variables labelled Δ indicate the initial differences of the previously mentioned variables.

As per the outcomes of the ADF unit root test, possibility values hold no significance when examining the level values of the variables. Therefore, for the instbl, shadow, gdp, m2 and crdt series, the null hypothesis of a unit root in the series cannot be rejected.

Upon examination of the initial difference values of the series, it becomes evident that the probability values hold significance. As a result, the null hypothesis stating that the series contains a unit root for the primary difference values is deemed as rejected. Based on the ADF unit root test results, it is determined that the aforementioned series achieves stationary status upon taking the first difference, with a stationarity level of I(1).

Table 3**: Unit Root Test Results**

	ADF		**Phillips-Perron**	
Variables	**t-stat.**	**p-value**	**t-stat.**	**p-value**
instbl	-1,445086	0,5373	-1,428944	0,5451
Δ instbl	-3,121806	0,0439*	-2,822543	0,0077*
shadow	-1,414524	0,5520	-1,538740	0,4918
Δ shadow	-3,501827	0,0213*	-3,491562	0,0217*
gdp	-2,342697	0,1704	-2,387723	0,1585
Δ gdp	-4,016309	0,0077*	-3,920593	0,0094*
m2	-1,667343	0,4299	-1,667343	0,4299
Δ m2	-3,965930	0,0086*	-3,965930	0,0086*
crdt	-1,984452	0,2902	-2,099721	0,2468
Δ crdt	-3,294381	0,0317*	-3,207759	0,0374*

Note: The lagged length selection for ADF is based on Schwarz Information Criteria (SIC), Phillips-Perron is based on Newey-West optimal adaptation lags.

After conducting a stationarity test on the series, the Johansen Co-integration Test was used to assess the existence of a long-term relationship between the variables under investigation. The findings of the cointegration test are presented in Table 4, indicating long-run cointegration between the variables. Put simply, it is evident that the series are integrated in the long run and move together.

Table 4**: Johansen Cointegration Test Result**

Trace Statistic Values				
H_0 Hypothesis: No cointegration	Eigenvalue	Trace stat.	Critical value (%5)	p-value**
None	0.713960	31.04351	25.87211	0.0104
At Most 1	0.436994	9.765899	12.51798	0.1382
Maximum Eigen Statistic Values				
H_0 hypothesis: No cointegration	Eigenvalue	Max. Eigen Stat.	Critical value (%5)	p-value**
None	0.713960	21.27761	19.38704	0.0263
At Most 1	0.436994	9.765899	12.51798	0.1382

Note 1: The Trace Test shows that there is a cointegration equation at the 0.05 level, * H_0 shows that the Hypothesis is rejected at the 0.05 level, ** MacKinnon-Haug-Michelis (1999) shows the probability values.
Note 2: The Maximum Eigenvalue Test shows that there is a cointegration equation at the 0.05 level, * H_0 hypothesis shows that it is rejected at the 0.05 level, ** MacKinnon-Haug-Michelis (1999) shows the probability values. This table consists of 2 parts.

Granger Causality Test was performed to determine the causal relationship between variables. Test results are shown in Table 5.

In the Granger Causality Test, the null hypothesis (H0) posits no causality between the variables, whereas the alternate hypothesis (H1) considers the presence of causality between the variables. Examining Table 5, we observe that the probability value of "instbl" is less than 5% when the

dependent variable is "shadow", leading to the rejection of the null hypothesis. Therefore, in essence, Shadow Banking stands as the Granger cause of Financial Instability. This scenario demonstrates a unidirectional causal link between “instbl” and “shadow”.

Table 5**: Granger Causality Test Results**

Causality Direction	Chi-Square Test Statistics	p-value
Dependent Variable: shadow		
instbl >shadow	6,831280	0.0329

Whether a deviation in the cointegrated series is corrected is tested using the error correction model. The model investigates how series moving away from equilibrium approach the average (Tari, 2010). The error correction model explains the differences in series and the lagged value of error terms obtained as a result of OLS estimation (ECTt-1). Consequently, the relevant model can be shown as follows:

$$\Delta linstbl = a_0 + a_1 \Delta shadow + a_2 \Delta gdp + a_3 \Delta m2 + a_4 \Delta crdt + a_5 ECT_{t-1} + \varepsilon_t \quad (4)$$

Table 6 shows the error correction model test results.

Table 6**. Error Correction Model Test Results**

Dependent Variable	Independent Variable	Coefficient	T-Stat.
Δlinstbl	Δshadow	0.015947	0.090669
	Δgdp	-0.734520	-6.384326
	Δm2	-0.020224	-0.438047
	Δcrdt	0.799298	32.14625
	ECT_{t-1}	-0.537073	-1.651882
	C	0.000808	0.053047
R^2 = 0.9976	F(p) = 0.00		DW = 1.53

Note: C refers constant term and ECT_{t-1} refers lagged error correction term.

According to the test results, the coefficient of the error correction term is statistically significant and falls between 0 and -1.

5. Conclusion

The size and complexity of shadow banking activities, along with inadequate regulatory frameworks to address systemic risks, continue to make their impact on financial stability a controvertible issue today. This has heightened the attention of financial regulators towards shadow banking, for its potential effects on financial stability. Hence, the primary motivation for this study was to understand the impact of shadow banking on financial stability.

The study investigated the association between shadow banking and financial instability in the United States during the 2000-2020 period. The researchers employed the VAR technique to achieve their objectives. Prior to modelling, the team conducted a series of tests, including unit root, autocorrelation, and heteroskedasticity tests, in order to establish a robust model.

The results of the tests were significant, and the Johansen cointegration test was utilised. It revealed that the series were cointegrated, indicating that they moved together in the long term.

When the results obtained from the study are compared, common results were obtained with the studies of Schneider (2022), Huang (2018), Moosa (2015) and Zou (2013). These results are supported by the mortgage crisis that occurred in the United States in 2008. Shadow banking is still in its early stages of growth worldwide. Objective measures are required from regulators to oversee the expansion of the shadow banking market, improve the regulatory environment and implement new regulations to strengthen control. Additionally, taking into account the influence of the shadow banking system on monetary policy, it appears that these regulations are crucial for the efficient allocation of resources.

As already stated in the literature, shadow banking had a significant impact on the 2008 global crisis that occurred in the USA. It can be said that the results are compatible with the literature.

The previous assessment was conducted on Granger Causation, revealing that there exists a causal relationship between shadow banking and financial instability during that period.

References

Diallo, B., and Al-Mansour, A. (2017). Shadow banking, insurance and financial sector stability. *Research in International Business and Finance*, *42*, 224-232.

Huang, J. (2015). Three essays on the economics of shadow banking. Princeton Dataspace. Retrieved from http://arks.princeton.edu/ark:/88435/dsp01mp48sg09m

Huang, J. (2018). Banking and shadow banking. *Journal of Economic Theory*, *178*, 124-152.

Ilesanmi, K. D., and Tewari, D. D. (2019). Management of shadow banks for economic and financial stability in South Africa. *Cogent Economics & Finance*, *7*(1), 1568849.

Krugman, P., Krugman, P. R., and Wells, R. (2009). *Macroeconomics*. Macmillan.

Liang, Y. (2016). Shadow banking in China: Implications for financial stability and macroeconomic rebalancing. *The Chinese Economy*, *49*(3), 148-160.

Longworth, D. (2012). Combatting the Dangers Lurking in the Shadows: The Macroprudential Regulation of Shadow Banking. *CD Howe Institute Commentary*, (361).

Moosa, I. A. (2017). The regulation of shadow banking. *Journal of Banking Regulation*, *18*, 61-79.

Okur, F. and Yılmaz, H. (2022). An Investigation of The Relationship Between Individual Energy Consumption and Economic Growth: The Future Perspective By Using The ANN Method. *Journal of Emerging Economies and Policy*, 7(1), 137-148.

Okur, F., and Soylu, Ö. B. (2020). Effect of Monetary Policy Instruments on Shadow Banking. *Business & Management Studies: An International Journal*, *8*(3), 2531-2545.

Schneider, H. (2022). Combination matters: why corporate bonds and shadow banking can threaten financial stability-a Minskyian perspective. *International Journal of Pluralism and Economics Education*, *13*(1), 103-119.

Shih, V., and Visiting Fellow, M. E. R. I. C. S. (2017). Financial instability in China: Possible pathways and their likelihood. *Mercator Institute for China Studies*, *20*.

Sieroń, A. (2016). The role of shadow banking in the business cycle. *Quarterly Journal of Austrian Economics*, *19*(4), 309-329.

Tarı, R. (2010). Ekonometri, Umuttepe Yayınları, Genişletilmiş 6. *Baskı, Kocaeli*.

Zou, X. P., Pang, Y. X., and Zhu, H. L. (2013). The study between shadow banking and financial fragility in China: an empirical analysis based on the co-integration test and error correction model. *Quality & Quantity*, *47*, 3363-3370.