

Credit allocation and systemic risk in the UK banking sector: an empirical study based on MES

Meng Zhu

University College London, London, UK

18796612811@163.com

Abstract. Following the 2008 financial crisis, the relationship between credit structure and systemic risk has garnered increasing attention in financial stability research. Systemic risk arises not only from the fragility of individual banks but also from structural similarities in credit allocation across institutions. This study examines how the composition of bank credit—specifically, the balance between household and corporate lending—affects systemic risk in the UK banking sector. Using data from HSBC, Barclays, and Lloyds covering 2016–2024, Marginal Expected Shortfall (MES) is employed to measure banks' exposure to market tail risk. The analysis shows that a growing share of household credit, particularly mortgage lending, significantly amplifies systemic risk, whereas corporate credit provides diversification benefits and reduces vulnerability. Furthermore, differences in business models account for the heterogeneity of systemic exposure: retail-focused banks are more sensitive to domestic shocks, while globally diversified banks demonstrate greater resilience. These findings offer micro-level evidence supporting the integration of credit composition into macroprudential policy design to enhance financial system stability.

Keywords: credit allocation, systemic risk, Marginal Expected Shortfall (MES), household lending, corporate credit, macroprudential regulation, UK banking sector

1. Introduction

Following the 2008 global financial crisis, systemic risk has emerged as a critical focus for financial regulation and research. Traditional regulatory frameworks, which center on the soundness of individual institutions, often struggle to capture the ripple effects within the financial system during extreme conditions. Systemic risk arises not only from individual institutional vulnerabilities but also from the intricate interconnections among financial institutions and the convergence of asset allocation patterns.

Recent studies indicate that credit structure significantly influences systemic risk. Expansion of household-sector credit is typically associated with heightened systemic risk. Household loans, such as mortgages, characterized by long maturities and volatile collateral values, can readily amplify crises during economic downturns through defaults and asset price declines. By contrast, corporate lending, which primarily serves the real economy, exerts a comparatively limited impact on systemic risk.

This paper examines how the composition of bank credit—specifically, the proportional balance between household and corporate lending—affects systemic risk within the UK banking system. Household credit refers to mortgage loans and consumer credit extended to individuals, while corporate credit denotes loans to non-financial enterprises. The study selects three representative banks—HSBC, Barclays, and Lloyds—as samples. These institutions possess distinct characteristics in business focus and loan structures, providing an ideal scenario for comparative research measuring the correlation between systemic risk and credit structure using Marginal Expected Shortfall (MES). By analyzing the relationship between household and corporate loan volumes and MES across these banks, the study investigates the impact of credit allocation on systemic risk from a business-structure perspective.

The paper's contributions are threefold. First, it employs a combined approach using micro-level financial statements and market data to examine the relationship between credit structure and systemic risk at the bank level. Second, by focusing on the UK banking system, it provides country-specific evidence that household credit expansion correlates with systemic risk. Finally, by comparing the risk characteristics of banks with different business models, it reveals the structural heterogeneity underlying systemic risk formation.

From a policy perspective, the findings highlight the need for macroprudential regulation to move beyond aggregate credit monitoring toward a more structural approach. Regulators should pay closer attention to banks' credit composition—particularly the balance between household and corporate lending—as excessive household credit growth, especially in mortgages, can heighten systemic vulnerability. Encouraging more diversified business structures and implementing targeted countercyclical tools can strengthen the resilience of the banking system against future shocks.

2. Literature review

2.1. Methods for measuring systemic risk

Current research on systemic risk has developed multiple measurement frameworks, with Marginal Expected Shortfall (MES), Conditional Value at Risk (CoVaR), and Systemic Risk Gap (SRISK) being the most widely used.

The MES framework, proposed by Acharya et al. [1], aims to measure the average loss incurred by individual financial institutions under extreme market conditions. This metric is widely applied in systemic risk research due to its ability to effectively capture an institution's marginal contribution to market tail risk. The ΔCoVaR , developed by Adrian and Brunnermeier [2], measures the risk transmission effect across the entire system when an institution experiences distress, focusing on risk spillover. Brownlees and Engle [3] built upon MES to construct the SRISK metric, which further assesses the scale of capital shortfalls faced by banks during crisis scenarios.

These market-data-based metrics offer the advantage of high-frequency updates, enabling the capture of tail correlations among financial institutions. Among them, MES stands out as an effective tool for analyzing banking systemic risk due to its computational simplicity and intuitive theoretical foundations. This paper selects MES as the core risk metric precisely because it directly measures banks' risk exposure during extreme market downturns and is inherently compatible with equity return data, making it well-suited to the research context of UK-listed banks.

2.2. Credit structure and financial vulnerability

Beyond aggregate credit volumes, the allocation of credit also plays a critical role in crisis formation. Empirical studies in recent years have consistently found that household credit expansion amplifies systemic risk more strongly than corporate credit.

Mian and Sufi [4], using US data, demonstrated that rising household-sector leverage was a primary catalyst for the 2007–2009 recession. Jordà et al. [5, 6], through long-term cross-country analysis, found that crises frequently emerge following credit booms dominated by housing loans, whereas corporate credit expansion exerts a relatively limited effect on crisis probability.

This divergence can be explained through multiple mechanisms. Household loans, particularly mortgages, are characterized by high leverage, low liquidity, and strong dependence on asset prices. Should the property market decline, the depreciation of collateral values can rapidly deteriorate bank asset quality, triggering a chain reaction. In contrast, corporate loans are more directly linked to productive investment, whose returns are less sensitive to macroeconomic cycles, resulting in a relatively milder transmission of systemic risk.

At the banking level, research by Andries et al. [7] further reveals that expansion in different credit sectors leads to structural differences in systemic risk. When bank assets are more concentrated in non-tradable sectors such as real estate, both MES and SRISK rise significantly, whereas lending to businesses is typically associated with lower systemic risk. This finding reinforces the theoretical perspective that “credit structure determines systemic vulnerability.”

Moreover, Huang et al. [8] introduced the concept of systemic risk contribution from a market perspective, analyzing individual institutions' marginal contributions to systemic risk through credit default swap pricing. Their research emphasizes that systemic risk frequently originates from interbank asset correlations and collective behavior rather than solely from individual risk levels. This perspective aligns closely with the focus of this paper: when banks simultaneously expand household lending while holding similar collateral assets, systemic correlations and tail risk intensify substantially.

2.3. Research positioning

While existing studies highlight the macro-level link between credit structure and systemic risk, they pay insufficient attention to structural differences among banks within a single country. In the UK context, in particular, micro-level analyses that combine bank-level data with market-based risk indicators remain limited.

This paper constructs a dataset of credit structures and Marginal Expected Shortfall (MES) for three major UK banks over the period 2016–2024. Adopting a descriptive approach, it examines the dynamic relationship between these variables, focusing on: (1) whether changes in household and corporate loan volumes correspond to trends in systemic risk, and (2) whether banks with different business models exhibit significant variations in systemic risk exposure.

3. Data and methodology

3.1. Sample selection and scope of study

The sample selection was based on the representativeness and complementarity of the three banks' business structures. HSBC Holdings operates as a globally diversified retail and commercial bank, with a balanced mix of household and corporate lending, and is classified as a Global Systemically Important Bank (G-SIB). Barclays PLC combines retail and investment banking activities, maintaining a relatively higher share of corporate and wholesale lending and strong exposure to market-sensitive operations, which contributes to its high systemic importance within the UK. In contrast, Lloyds Banking Group focuses primarily on the UK domestic market, specializing in retail and mortgage lending with limited investment banking exposure but substantial influence on domestic financial stability.

All three institutions provide comprehensive and consistent financial disclosures, ensuring comparability across years. Standard Chartered Bank was excluded due to its concentration in Asian and African markets, which reduces its relevance to the UK financial environment. These distinctions in business orientation and loan composition form the analytical basis for examining how differences in credit structure translate into systemic risk among UK banks.

3.2. Data sources and variable construction

Credit structure data were derived from sections such as "Customer Loans and Advances" or "Credit Risk Exposures by Segment" within each bank's annual reports. Loans were categorized into two types: household loans (including residential mortgages, credit cards, and personal consumer loans) and corporate loans (loans extended to non-financial enterprises and commercial clients). All loan figures are expressed in millions of pounds sterling, converted where necessary using average annual exchange rates, and presented as absolute values to accurately reflect credit scale.

Based on this, the following variables were constructed:

- Household_loans: Annual total household loans
- Corporate_loans: Annual total corporate loans
- Total_loans: Total loans

Supplementary indicators—the proportions of household and corporate loans—were also calculated to describe the evolution of credit structure characteristics.

3.3. Systemic risk measurement methodology

Systemic risk data were calculated using Yahoo Finance share price data, with the FTSE 100 Index serving as the market benchmark. Banks' systemic risk exposure is measured using Marginal Expected Shortfall (MES).

This study employs MES as the systemic risk metric [1]. MES measures the average loss incurred by an individual bank when market returns fall within the worst 5th percentile, effectively capturing the tail correlation between bank returns and market returns.

The calculation formula is as Equation (1):

$$MES_{i,t} = -E[R_{i,t} | R_{m,t} \leq VaR_{m,t}^{(5\%)}] \quad (1)$$

where $R_{\{i,t\}}$ denotes the daily return of bank i , and $R_{\{m,t\}}$ represents the daily return of the market index. The negative sign ensures that MES yields positive values, with higher figures indicating greater systemic risk. Rolling MES is calculated based on daily returns, and the annual average is taken as each bank's yearly systemic risk indicator.

The selection of MES is based on three considerations. First, it requires only market price data and has a straightforward and transparent calculation method. Second, its economic interpretation is intuitive, directly reflecting a bank's expected loss under extreme market conditions. Finally, it facilitates direct comparative analysis with changes in the bank's credit structure.

4. Descriptive analysis

This chapter presents a descriptive analysis of the evolution of credit structure and systemic risk for three major UK banks (HSBC, Barclays, and Lloyds) over the period 2016–2024. By comparing annual changes in household and corporate lending volumes alongside Marginal Expected Shortfall (MES), it highlights differences in risk exposure across banks with distinct business models.

Table 1. . Summary statistics (2016–2024)

Bank	Avg MES	SD MES	Avg Household Share	Avg Corporate Share
HSBC	0.025	0.010	0.385	0.592
Barclays	0.035	0.025	0.665	0.335
Lloyds	0.029	0.022	0.638	0.363

According to the calculated MES data presented in Table 1, Barclays records the highest average MES alongside the largest share of household loans, whereas HSBC exhibits the lowest values on both measures, with Lloyds positioned in between. This pattern suggests a positive association between retail-focused lending and systemic risk exposure. Moreover, Barclays shows the greatest variability in MES over the sample period, reflecting its substantial exposure to market-sensitive activities such as investment banking and trading operations. These business segments tend to amplify systemic risk during periods of heightened market volatility—such as the 2020 pandemic shock—resulting in larger fluctuations in Barclays’ risk profile compared with the more retail-oriented HSBC and Lloyds.

All three institutions are classified as commercial banks but differ in the degree of diversification. HSBC and Barclays operate as universal banks, combining commercial banking with investment and wholesale operations, whereas Lloyds is primarily a retail-focused commercial bank, concentrating on household and mortgage lending. This distinction is directly relevant to the research question: differences in the balance between household and corporate lending across these business models shape each bank’s exposure to systemic risk. Retail-dominated institutions tend to amplify systemic vulnerability during downturns, while diversified or corporate-focused banks exhibit comparatively greater resilience.

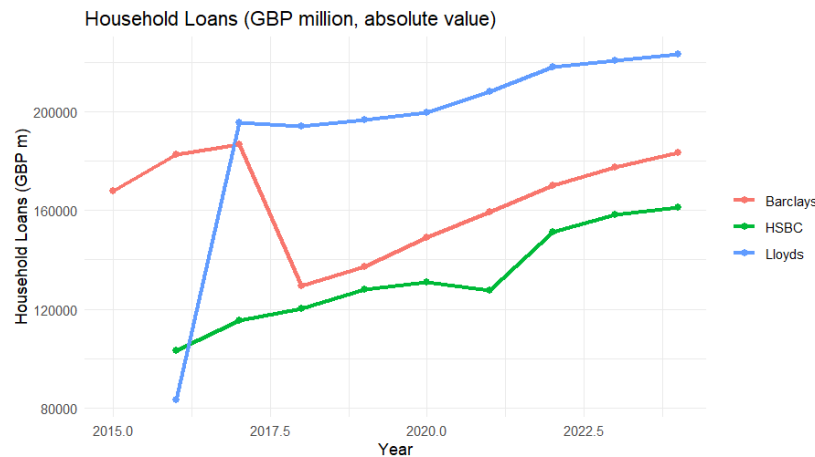
**Figure 1.** Household loan volume trends (household loans, GBP million)

Figure 1 illustrates the evolution of household loan volumes across the three banks. Overall, household lending follows an upward trajectory for all institutions, reflecting the sustained expansion of UK retail credit. Specifically, Lloyds consistently maintained the highest household loan volume, exceeding £200,000 million by 2024, in line with its strategic focus on retail banking. Barclays’ household loans declined after 2017 but resumed growth post-2019, demonstrating resilience following business restructuring. HSBC exhibited the most stable growth trajectory, reflecting its globally oriented business model.

This trend indicates sustained activity in the UK household credit market. However, Lloyds’ asset structure remains highly sensitive to UK economic cycles due to its substantial reliance on domestic mortgage lending.

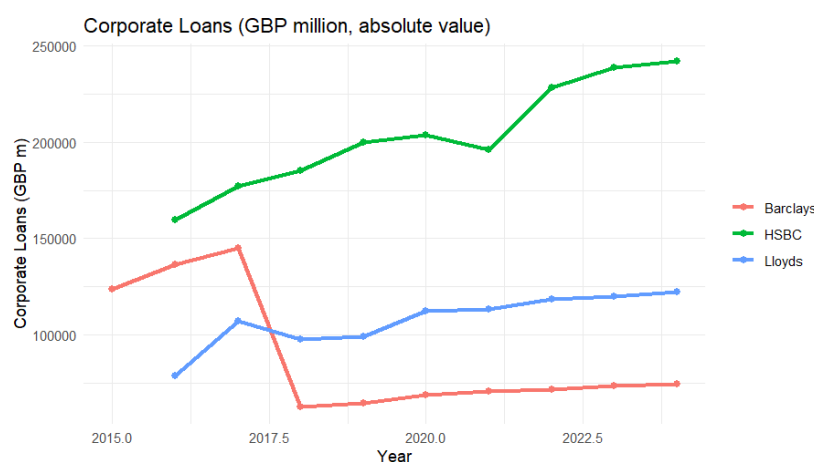


Figure 2. Corporate loan volume trends (corporate loans, GBP million)

Figure 2 illustrates the evolution of corporate lending across the three banks. Compared with household lending, corporate loan growth has been relatively constrained, with pronounced disparities among institutions. HSBC consistently maintained a leading position in corporate lending, reaching approximately £240 billion in 2024, underscoring its strength in commercial banking. While Lloyds recorded steady growth in corporate lending, its scale remained modest relative to its substantial household loan portfolio. Barclays' corporate lending contracted markedly from 2017 onwards and remained at comparatively low levels post-2019, reflecting its strategic pivot toward investment banking operations.

The overall corporate lending performance reflects the uncertainties confronting the UK economy during the Brexit transition period and the post-pandemic era, while also indicating banks' preference for allocating credit resources to the household sector, whose risk profile is relatively more defined.

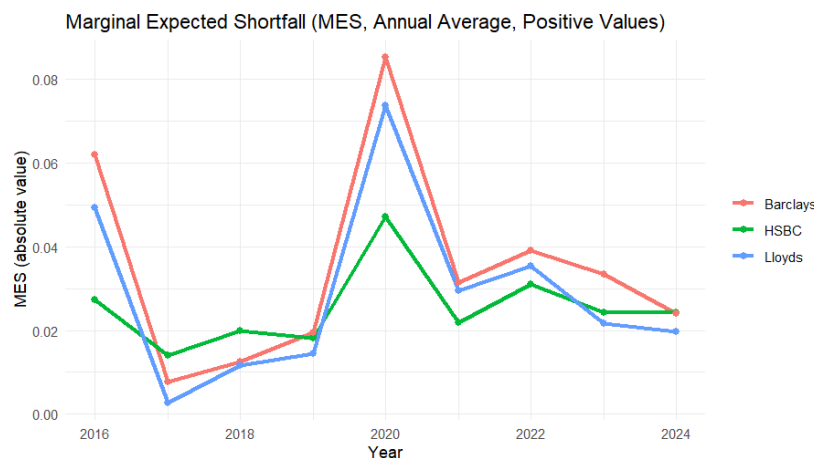


Figure 3. Systemic risk trends (marginal expected shortfall, MES)

Figure 3 illustrates the annual evolution of systemic risk across the three banks, highlighting three key characteristics. First, the overall risk level exhibits a fluctuating downward trend, peaking during the 2020 pandemic before gradually declining and stabilizing in 2023–2024. Second, Barclays consistently shows the highest MES values, reaching approximately 0.085 in 2020. This aligns with its business structure, in which market-sensitive investment banking operations constitute a significant proportion of activities. Third, HSBC and Lloyds demonstrate comparatively lower systemic risk, with Lloyds' 2024 MES value standing at just 0.02, underscoring the resilience of retail-dominated operations under normal economic conditions.

These observations indicate that systemic risk among major UK banks is closely linked to the macroeconomic environment and is significantly shaped by their respective business models.

5. Comprehensive analysis

Combining the above charts reveals that the sustained expansion of household lending is broadly synchronized with systemic risk levels over time. This pattern is particularly pronounced for Lloyds Banking Group, whose operations are highly concentrated in domestic retail lending. In contrast, HSBC's international business footprint and corporate lending strengths, as well as Barclays' diversified investment banking operations, contribute to a degree of risk diversification.

These observations support the paper's central argument: a bank's credit allocation structure is intrinsically linked to its systemic risk profile, with a dominant household lending position potentially amplifying risk exposure during economic downturns. This finding provides important empirical evidence for understanding disparities in risk among banks with distinct business models.

6. Discussion

Building on the preceding analysis, this chapter examines systemic risk disparities among the three major UK banks from a credit structure perspective, elucidating the underlying mechanisms through relevant theoretical frameworks.

6.1. Household loan expansion and systemic risk accumulation

This study finds that all three banks experienced sustained growth in household lending between 2016 and 2024, with Lloyds demonstrating particularly pronounced expansion due to its strategic focus on domestic retail banking. Notably, the systemic risk indicator (MES) exhibited a synchronous upward trend during periods of rapid household credit growth. This finding aligns with the conclusions of Jordà et al. , which emphasize the role of household-sector credit in driving financial fragility.

Household loans, particularly mortgages, are characterized by long maturities and significant fluctuations in collateral value. When banks concentrate their assets heavily in such loans, a decline in collateral value during economic downturns simultaneously weakens both bank asset quality and household debt-servicing capacity, generating a risk resonance effect. The marked rise in MES during the 2020 pandemic exemplifies this dynamic: despite continued household loan growth, external shocks accelerated the materialization of latent risks. Lloyds provides a particularly illustrative case, where MES remained low during stable periods but surged dramatically under pandemic stress, underscoring the pivotal role of household credit-dominated banks in crisis transmission.

6.2. Risk mitigation role of corporate loans

By contrast, corporate lending demonstrates pronounced risk-diversification effects. Leveraging its global commercial banking strengths, HSBC consistently leads in corporate loan volumes while maintaining a significantly lower MES than Barclays. This observation aligns with the perspective of scholars such as Andries et al.: corporate loans, being closely linked to real economic activity and typically exhibiting superior liquidity and diversification characteristics, contribute relatively modestly to systemic risk.

HSBC's case vividly illustrates the buffering effect of a diversified business structure: even during broad market downturns, its cross-regional and multi-sector business footprint effectively hedges against single-market shocks. In contrast, Barclays' relatively limited corporate lending is counterbalanced by the high market sensitivity of its investment banking operations, resulting in persistently elevated MES levels. This indicates that a bank's risk exposure depends not only on its credit allocation but also on the market sensitivity of its revenue streams.

6.3. Differentiated business models and risk characteristics

The divergence in systemic risk profiles among the three banks fundamentally reflects their distinct business models:

Lloyds Banking Group, as a specialist in domestic retail banking, exhibits highly concentrated risk exposure within the UK market, with its systemic risk closely tracking the domestic economic cycle;

Barclays, underpinned by investment banking activities, has a revenue structure tightly linked to financial market volatility, making it particularly sensitive to market extremes;

HSBC's global footprint provides effective risk diversification, establishing inherent buffers across different regions and business lines.

These disparities support the theoretical perspective of Acharya et al. [9]: systemic risk arises not only from individual institutions' leverage levels but also critically depends on the correlation between their returns and systemic returns. When banking portfolios converge on specific sectors, systemic tail correlations intensify, thereby elevating overall financial fragility.

6.4. Structural impacts of the macroeconomic environment

Between 2016 and 2024, the UK banking system navigated major events, including Brexit-related adjustments and the pandemic shock. These macroeconomic shifts further amplified structural disparities in banks' risk exposures. Brexit-related uncertainty dampened corporate investment confidence, prompting banks to redirect credit resources toward the household sector. While accommodative policies during the pandemic supported economic recovery, they also contributed to further increases in household-sector leverage.

Against this backdrop, the temporal evolution of Marginal Expected Shortfall (MES) highlights the risk implications of credit-structure adjustments: banks with higher household loan exposures demonstrated greater vulnerability to external shocks, whereas more diversified institutions exhibited stronger resilience.

6.5. Research implications

This study indicates that the composition of bank credit, rather than the total credit volume, is the key dimension for understanding systemic risk. Different business models shape the roles banks play in transmitting or absorbing risk. The findings suggest that macroprudential regulation should move beyond the traditional focus on capital adequacy and place greater emphasis on shifts in credit structure, particularly the potential systemic risks arising from household-sector credit expansion.

7. Conclusion

This study examines the impact of bank credit structure on systemic risk within the UK banking system. Using data from HSBC, Barclays, and Lloyds over the period 2016–2024, the findings indicate that the balance between household and corporate credit allocation is a critical structural factor in determining systemic vulnerability.

The results show that excessive expansion of household-sector credit—particularly housing mortgages—amplifies systemic risk, whereas corporate credit exerts a stabilizing effect by supporting real investment and diversifying portfolio risks. Moreover, variations in business models shape differences in risk exposure: retail-focused Lloyds is more susceptible to domestic credit cycles, while globally positioned banks such as HSBC benefit from inherent risk diversification.

These findings highlight that credit structure should be a central consideration in systemic risk monitoring and macroprudential regulation. An effective financial stability framework should complement aggregate supervision with structural oversight, promoting balanced credit allocation and diversified banking operations. Compared with a focus solely on credit volume, regulation that emphasizes credit structure is more effective in preventing the accumulation of systemic risks, thereby enhancing the resilience and stability of the financial system.

References

- [1] Acharya, V. V., Pedersen, L. H., Philippon, T., & Richardson, M. (2017). Measuring Systemic Risk. *The Review of Financial Studies*, 30(1), 2–47. <https://doi.org/10.1093/rfs/hhw088>
- [2] Adrian, T., & Brunnermeier, M. K. (2016). CoVaR. *American Economic Review*, 106(7), 1705–1741. <https://doi.org/10.1257/aer.20120555>
- [3] Brownlees, C., & Engle, R. F. (2017). SRISK: A Conditional Capital Shortfall Measure of Systemic Risk. *The Review of Financial Studies*, 30(1), 48–79. <https://doi.org/10.1093/rfs/hhw060>
- [4] Mian, A., & Sufi, A. (2010). Household Leverage and the Recession of 2007 to 2009. *Quarterly Journal of Economics*, 125(1), 145–194. <https://doi.org/10.1162/qjec.2010.125.1.145>
- [5] Jordà, Ò., Schularick, M., & Taylor, A. M. (2016). The Great Mortgaging: Housing Finance, Crises and Business Cycles. *Economic Policy*, 31(85), 107–152. <https://doi.org/10.1093/epolic/eiv017>
- [6] Jordà, Ò., Schularick, M., & Taylor, A. M. (2022). Credit Booms, Financial Crises, and the Long-Run Effects of Credit. *Annual Review of Financial Economics*, 14, 43–68. <https://doi.org/10.1146/annurev-financial-110620-024520>
- [7] Andries, A. M., Ongena, S., Penas, M. F., & Sava, A. (2025). Sectoral Credit Allocation and Systemic Risk. *Journal of Financial Stability*. (Forthcoming).
- [8] Huang, X., Zhou, H., & Zhu, H. (2012). Systemic Risk Contributions. *Journal of Financial Services Research*, 42(1–2), 55–83. <https://doi.org/10.1007/s10693-011-0103-9>
- [9] Adrian, T., & Shin, H. S. (2010). Liquidity and Leverage. *Journal of Financial Intermediation*, 19(3), 418–437. <https://doi.org/10.1016/j.jfi.2008.12.002>