The impact of Covid-19 on the Euro Area banks' balance sheets

Maria-Eleni K. Agoraki
Department of Accounting and Finance
University of the Peloponnese
Antikalamos, GR-24100, Greece
Email: m.agoraki@uop.gr

Georgios P. Kouretas (corresponding author)*
IPAG Business School,
184 Boulevard Saint-Germain, FR-75006, Paris, France
and
Department of Business Administration, Athens University of Economics and Business,
76 Patission Street, GR-10434, Athens, Greece, Email: kouretas@aueb.gr

Francisco Nadal De Simone
Department of Finance, University of Luxembourg
nadaldesimone@ext.uni.lu

22 August 2022

Abstract

In line with most studies, Agoraki *et al* (2022) found that at the euro area aggregate banking level the Covid-19 pandemic does not seem to have impacted negatively the industry's performance during the period until 2021:Q1. This follow-up study explores the likelihood that at a disaggregated level banks have suffered from increased inefficiencies and weaknesses stemming from underlying structural vulnerabilities and the expected rise in non-performing loans. It explores the performance of 16 major euro area banking groups using return on assets as a metric. It explicitly addresses the endogeneity of most bank-specific determinants of return on assets. Banks are separated into groups using unsupervised learning techniques with clusters based on banks' performance as well as classifying banks as Global Systemically Important or not. The main finding is that banks' performance has been heterogeneous notably due to the differential impact the pandemic has had on banks' asset quality and solvency. The main drivers are banks' business models, leverage, and loss-absorption capacity.

Very preliminary version: Please do not quote without the authors' permission

I.   Introduction

Most studies assessing the impact of the Covid-19 pandemic on banks' performance have found relatively small negative effects on banks' solvency, liquidity, lending and returns, likely due to the massive monetary, fiscal and regulatory measures taken to protect households, non-financial firms and the financial sector (e.g. Berger and Demirguc-Kunt, 2021, Sclurarick et al, 2020), International Monetary Fund, 2021, and Colak and Oztekin, 2021). Agoraki et al (2022) find that the euro area banking sector's performance has not been negatively affected in a statistically significant way and that the Covid-19 pandemic did not introduce uncertainty in the performance of the industry as it was the case following the global financial and the sovereign crises. While policy measures during the Covid-19 pandemic might have sheltered banks' returns allowing banks to buy time so as to adjust to a major low-frequency-high-impact shock, the same policies may have reduced the effect of competitive forces on banks' performance and perhaps increased inefficiencies and vulnerabilities (e.g. "zombie lending" as argued by Dursum-de Neef and Schandlbauer, 2021. Looking forward, the phasing-out of Covid-19 driven policies may entail risks for the euro area banking industry stemming from the expected rise in non-performing loans and the underlying banks' structural vulnerabilities.

At a disaggregated bank level, studies find that banks' performance is affected by their expected capital shortfall (e.g. Schularick et al, 2020), the size of their non-performing loan portfolio (e.g. OECD, 2021), the ownership structure (Norden et al, 2021), and the effect of the pandemic on systemic risk (e.g. Duan, 2021). Against this background, this study draws on Agoraki et al (2022) with the objective of deepening the analysis of a set of 16 euro area banks' performance during the Covid-19 pandemic as measured by their return on assets (ROA). To the authors' best

knowledge, it is the first paper to assess the performance at the bank level during the Covid-19 pandemic distinguishing simultaneously across several balance-sheet dimensions and regulatory-driven banks' characteristics: the size of loan-loss provisions, leverage, probability of default, non-interest income, capitalization, management quality and diversification. In addition, banks' performance is also analyzed by clustering the banks according to their ROA, the level of their T1 capital ratio, diversification and probabilities of default using unsupervised learning techniques. As it may be expected, bank clusters' performance varies significantly across banks' notably due to the differential impact the pandemic has had on banks' asset quality and solvency. The results highlight the difficulty of regulating banks because business models determine responses to regulation.[1]

---

[1] The optimality of taxes, quantitative constraints or the use of both depends on prevailing business model characteristics and regulators cannot target individual banks' characteristics (Perotti and Suarez, 2010).

3. Data, sample selection and variables

Data are quarterly seasonally adjusted and cover the period 2002:Q3-2021:Q2. The database includes balance sheet and profit-and-loss accounts data of 16 large euro area banking groups, roughly half of which are classified as Global Systemically Important Banks by the Financial Stability Board (Appendix I). Data on real GDP and the Harmonized Consumer Price Index (HCPI) are retrieved from the ECB Data Warehouse and all required data on banks' balance sheets and capital adequacy are retrieved from Bloomberg. The diversification index and Henrfindhal-Hirschman index are authors' estimates. Diversification is defined as the ratio of non-interest income to total bank revenue, following Kok et al., (2015). Finally, the study uses three Covid-19 measures. First, the Stringency Index records the strictness of 'lockdown style' policies that primarily restrict people's behaviour. It is calculated using all ordinal containment and closure policy indicators plus an indicator recording public information campaigns. Second, the Economic Support Index records measures such as income support and debt relief. It is calculated using ordinal economic policies indicators. Third, the number of Confirmed Deaths is used. Data for Covid-19 measures is retrieved from Blavatnik School of Government and Oxford University and the Covid-19 Government Response Tracker. The definitions of all the variables employed in the present analysis are in Appendix II. Table 1 presents the summary statistics for our macro and Covid-19 indices data.

[*Please insert Table 1 here*]

Non-stationary time series are made stationary using the Corbae-Ouliaris' Ideal Band-pass Filter (Corbae and Ouliaris, 2006).[2] This approach avoids having to first-difference non-stationary time series given that first-differencing is a high-pass filter with a gain function ''that deviates substantially from the squared gain function of an ideal high-pass filter'' (Koopmans, 1974).[3] Corbae-Ouliaris' filter has no finite sampling error, superior end-point properties and lower mean-squared error than popular time domain filters such as Christiano and Fitzgerald (2003). In addition, it is consistent, in contrast to Baxter and King (1995) filter. All data are standardized.

---

[2] Euro area real GDP is integrated of order 2 (I (2)) over the sample period. Thus, Corbae-Ouliaris' Ideal Band-pass Filter for I(2) time series was used. It was kindly provided by Sam Ouliaris.
[3] See Igan et al. (2011) for a detailed discussion and examples.

4. Econometric methodology

The econometric methodology is two pronged. First, the dynamic balanced panel estimation uses Arellano and Bond (1991), Arellano and Bover (1995). The second part of the econometric estimation applies Arellano and Bond (1991) to clusters of banks to better assess and highlight the heterogeneous effects that drivers of performance have across the same 16 banks. Clusters are formed according to banks' median ROA, level of T1 capital ratio, diversification, and probabilities of default.[4] The method followed for clustering is first Hierarchical deciding between Single and Complete Linkage based on the cophenetic correlation coefficient (Table 2). This approach provides a first indication of the number of clusters in the tree, normally 2 or 3. Then, the K-Means Clustering procedure is applied using the number of clusters suggested in the first step. The clusters' results are assessed using the Silhoutte Statistic of Kaufman and Rousseeuw (1990).[5] An additional bank cluster follows a regulatory approach classifying banks according to whether they are or not Global Systemically Important Banks on the Financial Stability Board list of November 2021.

[*Please insert Table 1 here*]

---

[4] Probabilities of default (1 year) are estimated using Delianedis and Geske (2003) compound option-based structural credit risk model.
[5] The Mojena plots (Mojena, 1970)—not shown—confirm that the numbers of clusters (i.e. dendograms) represent adequately the dissimilarities across banks' characteristics.

Appendix I – Euro Area Banking Groups

Banca Popolare dell' Emilia Romagna Sc

Banco Santander SA *

Commerzbank AG

Crédit Suisse Group AG *

Credito Emiliano Spa

Danske Bank A/S

Deutsche Bank AG *

EFG Eurobank Ergasias SA

ING Groep N.V. *

Intesa SanPaolo SpA

JP Morgan Chase & Co *

Mediobanca S.p.A.

Nordea Bank AB

Royal Bank of Canada *

Skandinaviska Enskilda Banken AB

UniCredit SpA *

Note: Banks with an asterisk are classified as Globally Systemic Important Banks according to the Financial Stability Board, November 2021 list.

Appendix II: Variable Definitions

	Panel A: Bank Characteristics
ROA	ROA is return on assets measured as the ratio of EBITDA to total assets. EBITDA refers to earnings before interest, taxes, depreciations, and amortization.
Total Loans	Banks' total loans in euros.
Loan-loss Provisions	Provisions for non-performing loans. Non-performing loans defined αs the ratio of non-performing loans to total loans.
Non-interest Income	Income excluding interest income in euros.
T1 Capital Ratio	The ratio of core equity capital to risk-weighted assets.
Management Quality	Ratio of operational expenses to total assets.
Bank Size	Total assets in euros.
	Panel B: Macroeconomic variables
Real GDP	Gross Domestic Product of euro area in 2010 constant prices.
Unemployment Rate	Unemployment rate, from 15 to 74 years of age, percentage of active population.
Harmonized Consumer Price Index (HCPI)	HCIPs are compiled based on harmonised standards, binding for all European Union Member States. Conceptually, The HCIP are Laspeyres-type price indices and are computed as annual chain-indices allowing for weights changing each year, reference period (2015 = 100). The common classification for Harmonized Indices of Consumer Prices is the COICOP (Classification of Individual Consumption by Purpose).
	Panel C: Market Structure
Diversification	The ratio of non- interest income to total bank revenue.
Herfindhal-Hirschman Index	The sum of the squared market shares in total assets of the individual banks.
	Panel D: Covid-19 measures
Stringency Index	The index records the strictness of 'lockdown style' policies that primarily restrict people's behaviour. It is calculated using all ordinal containment and closure policy indicators plus an indicator recording public information campaigns.
Economic Support Index	The index records measures such as income support and debt relief. It is calculated using ordinal economic policies indicators.
Confirmed Deaths	The number of Confirmed Deaths.

Table 1: Descriptive statistics of non-bank variables

The Table reports descriptive statistics for the period 2002:Q3 to 2021:Q2. Real GDP is the Gross Domestic Product of euro area in 2010 constant prices. HICP is the harmonized Index of Consumer Prices and is compiled based on harmonised standards, binding for all European Union Member States. Stringency Index is the index that records the strictness of 'lockdown style' policies that primarily restrict people's behaviour. Economic Support Index is the index that records measures such as income support and debt relief. Confirmed Deaths is the number of Confirmed Deaths.

Table 1 : Sample Statistics					
		2002Q3 - 2021Q2			
Time Series	Observations	Mean	Standard Deviation	Minimum	Maximum
RGDPSA_EA19I2	76	2430097.76	134053.93	2191649.90	2688070.50
HICP_EA19 (1)	76	95.10	8.03	79.75	107.25
SI (1)	76	5.01	17.64	0.00	77.76
ESI (1)	76	6.44	22.25	0.00	88.56
CD (2)	76	20395	87160	0	528235
Units: (1) index, (2) persons and the remainder time series units are euros.					

#		ROA			T1		DIVERSIF			STPD		
		CL1	CL2	CL3	CL1	CL2	CL1	CL2	CL3	CL1	CL2	CL3
1	Banca Popolare dell Emilia Romagna Sc			x		x			x	x		
2	Banco Santander SA		x			x	x				x	
3	Commerzbank AG	x				x	x				x	
4	Crédit Suisse Group AG	x				x	x					x
5	Credito Emiliano Spa	x			x		x					x
6	Danske Bank A/S	x			x				x	x		
7	Deutsche Bank AG		x		x		x					x
8	EFG Eurobank Ergasias SA		x			x	x				x	
9	ING Groep N.V.		x			x	x					x
10	Intesa SanPaolo SpA			x		x		x			x	
11	JP Morgan Chase & Co		x			x	x					x
12	Mediobanca S.p.A.	x				x		x			x	
13	Nordea Bank AB		x		x				x			x
14	Royal Bank of Canada			x	x		x			x		
15	Skandinaviska Enskilda Banken AB		x			x		x				x
16	UniCredit SpA		x		x			x			x	

Memo Items:

	ROA	T1	DIVERSIF	STPD
Cophenetic Correlation Coefficient for Single Linkage	0.68	0.76	**0.74**	0.82
Cophenetic Correlation Coefficient for Complete Linkage	**0.74**	**0.77**	0.73	**0.84**
Mean Silhouette for 2 Clusters	0.83	**0.82**	0.68	0.73
Mean Silhouette for 3 Clusters	**0.91**	0.74	**0.80**	**0.76**

Table 2 : Clusters