Off-Balance-Sheet Activities and Scope Economies in U.S. Banking

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Summary

- New and more robust analysis of scope economies in the post-2009 U.S. commercial banking.
- The analysis uses the most recent data, accounts for bank's "nontraditional" operations and improves upon the prior literature in multiple methodological ways, including employing the methodology that is more robust to excessive extrapolation.
- We estimate a flexible time-varying-coefficient panel-data quantile regression model which accommodates three-way heterogeneity across banks
- Strong empirical evidence in support of significantly positive scope economies across banks of virtually all sizes. Contrary to earlier studies, we find no material evidence in support of scope diseconomies.

Motivation

- The Dodd–Frank Reform and the Consumer Protection Act of 2010 seek to eliminate the "too-big-too-fail" doctrine by setting restrictions on the scale and scope of bank operations, which may limit banks' ability to capitalize on the potential cost savings associated with operating at a large scale with a more diversified product scope.
- Large banks may derive cost efficiency benefits from their ability to offer financial services at lower average cost due to (i) scale economies driven by the increasing returns to scale as well as (ii) scope economies via input complementarities and positive spillovers.
- Existing (two-decade-old) empirical evidence lends no support for product-scope-driven cost economies in banking, but it is greatly outdated and, surprisingly, there has been little (if any) research on this subject despite the drastic transformations that the U.S. banking industry has undergone over the past two decades.
- Particularly, propelled by the recent financial product innovations involving derivatives, securitization and mortgages, banks are becoming more complex, branching out into many "nontraditional" off-balance-sheet operations. This broadening of operational scope in a pursuit of revenue diversification may be beneficial *if* banks exhibit scope economies.

Data

The bank-level data (2009-2018) come from the Reports of Condition and Income and the Uniform Bank Performance Reports. The sample includes 44,704 observations for 7,232 banks.

- Three outputs: Y1 — total loans; Y2 — total securities; Y3 —off-balance-sheet operations (proxied by the sum of credit-equivalent measures of various off-balance sheet activities)
- Three variable inputs and their respective prices: X1 (W1) — physical capital measured by fixed assets; X2 (W2)— labor, measured as the number of full-time equivalent employees; X3 (W3)— total borrowed funds, inclusive of deposits
- Additional controls: K1 — equity capital; K2 — ratio of nonperforming assets to total assets; K3—ratio of loan loss provision to total assets

Empirical Model

We estimate the bank's time-varying translog cost function $\mathcal{C}_t(\cdot)$ at different conditional quantiles of costs:

$$\mathcal{Q}_c\left[\tau|\boldsymbol{v}_{it}\right] \equiv \ _0(\tau,t) + \ _1(\tau,t)'\boldsymbol{v}_{it} + \frac{1}{2}\ _2(\tau,t)'\text{vec}\left(\boldsymbol{v}_{it}\boldsymbol{v}_{it}'\right) + \mu_{i,\tau}$$

Theory of Multi-Product Costs

- A bank is said to exhibit scope economies if its average cost is decreasing in the number of outputs/operations.
- To test for scope-driven cost savings, we use an expansion-path measure of cost subadditivity, for which scope economies are a necessary condition. The subadditivity measure relies on comparison of the costs of smaller multi-output banks of differential degrees of specialization with the cost of a larger, more diversified bank.
- For some distribution weights $0 \leq \varpi_m^\kappa \leq 1$ such that $\sum_\kappa \varpi_m^\kappa = 1$ for all $m = 1, 2, 3$ and $\kappa \in \{A, B, C\}$, the bank is said to enjoy scope economies at time t if

$$\sum_{\kappa\in\{A,B,C\}} \mathcal{C}_t\big(\varpi_1^\kappa Y_1, \varpi_2^\kappa Y_2, \varpi_3^\kappa Y_3\big) - \mathcal{C}_t\big(Y_1, Y_2, Y_3\big) > 0$$

- The quantitative measure of cost subadditivity $\mathcal{S}_t$ (in proportions) is:

$$\mathcal{S}_t = \frac{\sum_{\kappa\in\{A,B,C\}} \mathcal{C}_t\big(\varpi_1^\kappa Y_1, \varpi_2^\kappa Y_2, \varpi_3^\kappa Y_3\big) - \mathcal{C}_t\big(Y_1, Y_2, Y_3\big)}{\mathcal{C}_t\big(Y_1, Y_2, Y_3\big)}$$

- We adopt a conservative approach to measuring cost subadditivity, whereby $\{\varpi_m^\kappa\}$ are chosen such that the corresponding $\mathcal{S}_t$ is the smallest.

Results

We find strong evidence in support of significantly positive scope economies across banks of virtually all sizes.

Table 1:Cost Subadditivity Estimates

Cost	*Point Estimates*				*Inference Categories, %*			
Quantiles (τ)	Mean	1st Qu.	Median	3rd Qu.	$=\mathbf{0}$	$\neq 0$	$>\mathbf{0}$	≤ 0
$\mathcal{Q}(0.10)$	0.138	0.078	0.125	0.181	**9.76**	90.24	**92.04**	7.96
	(0.058, 0.469)	(0.023, 0.288)	(0.048, 0.463)	(0.082, 0.626)				
$\mathcal{Q}(0.25)$	0.175	0.107	0.163	0.225	**5.48**	94.52	**95.70**	4.30
	(0.078, 0.598)	(0.036, 0.361)	(0.067, 0.579)	(0.106, 0.777)				
$\mathcal{Q}(0.50)$	0.264	0.175	0.258	0.335	**1.40**	98.60	**98.90**	1.10
	(0.120, 0.937)	(0.066, 0.549)	(0.109, 0.873)	(0.155, 1.185)				
$\mathcal{Q}(0.75)$	0.388	0.259	0.394	0.496	**0.45**	99.55	**99.50**	0.50
	(0.194, 1.205)	(0.103, 0.683)	(0.169, 1.113)	(0.242, 1.582)				
$\mathcal{Q}(0.90)$	0.459	0.313	0.476	0.575	**0.30**	99.70	**99.60**	0.40
	(0.261, 1.164)	(0.121, 0.671)	(0.231, 1.036)	(0.356, 1.567)				

The left panel summarizes point estimates of $\mathcal{S}_t^*(\tau)$ with the corresponding two-sided 95% bias-corrected confidence intervals in parentheses. Each bank-year is classified as exhibiting scope economies [$\mathcal{S}_t^*(\tau) > 0$] vs. non-economies [$\mathcal{S}_t^*(\tau) \leq 0$] and scope invariance [$\mathcal{S}_t^*(\tau) = 0$] vs. scope non-invariance [$\mathcal{S}_t^*(\tau) \neq 0$] using the corresponding one- and two-sided 95% bias-corrected confidence bounds, respectively. The right panel reports sample shares for each category and for its corresponding negating alternative. Percentage points sum up to a hundred within binary groups only.

Results

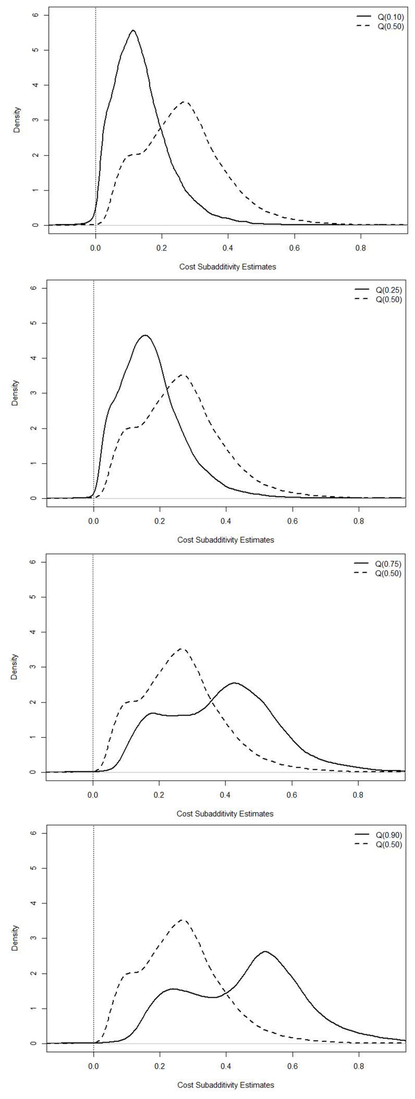

Figure 1:Kernel Densities of Cost Subadditivity Estimates Across Cost Quantiles

Robustness Checks

- Our results are robust to measuring off-balance-sheet items using non-interest income minus service charges on deposits.
- Our results are robust to considering five outputs by disaggregating total loans into consumer, real estate and commercial loans.