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Bank performance and real sector productivity in East Africa

Odongo Kodongo*

Abstract

This paper sought to establish the linkages between bank performance and real sector productivity. We use data for five East African countries (Ethiopia, Kenya, Rwanda, Tanzania, and Uganda) for the period 2014–2022. We initially deploy the traditional panel fixed effects regression and subsequently the instrument variable fixed effects estimation for robustness checks. Our results show a robust negative nexus between banking sector performance and real sector productivity. Second, we find that noninterest charges is the major channel of transmission of adverse effects from the banking sector to real sectors such as manufacturing, while the interest channel tends to transmit positive effects especially to the services sector. Based on these findings, we make several policy recommendations.

Keywords: Real sector productivity; sectoral value-added; bank profitability; cost efficiency; East Africa

JEL Classification:

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1.0 Introduction

The banking sector plays the crucial role of intermediating financial resources in an economy. The intermediation role broadly constitutes a dichotomy of activities: first, banks facilitate mobilization and accumulation of resources (savings) by minimizing transaction costs and diversifying risks; and secondly, they efficiently allocate the accumulated resources to enterprises to facilitate their productive activities (Lucchetti, Papi, & Zazzaro, 2001).

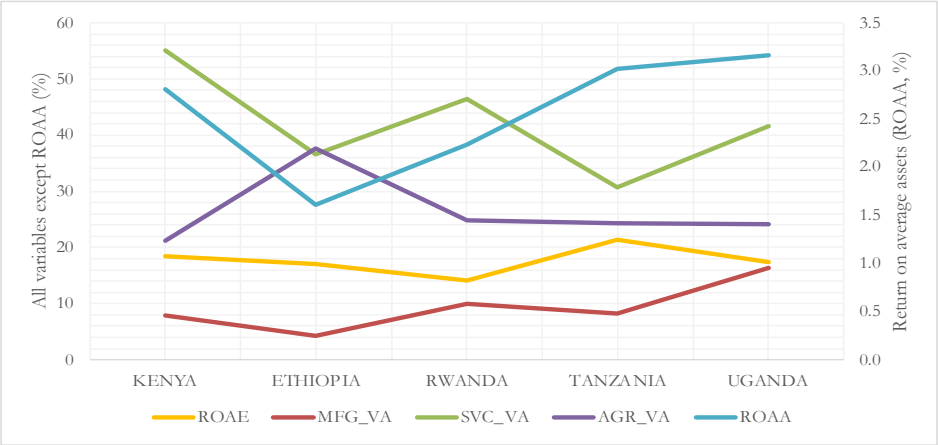
If done efficiently, banks' borrowing rate (reward to savers) should be at the level that minimizes the opportunity cost of saving for economic agents appropriating a surplus of funds (mostly households), and the lending rate should be at a level that minimizes the cost of capital for economic agents appropriating a deficit (e.g., enterprises). Thus, by efficiently conducting their resource accumulation and allocation roles, banks should earn no more than the "normal" profit on their intermediation activities and facilitate the maximization of output of productive enterprises. In a well-functioning economy, therefore, it is expected that banks' economic profits (e.g., net profit margin) and accounting profits (e.g., return on assets) would be closely related to real sector productivity[1].

In the East African region, the banking sector has witnessed sustained growth over the last decade or so. For example, FRED[2] data show that Kenya's banking sector, the largest in the region, had assets valued at 49.2% of the country's gross domestic product (GDP) as of 2020, having grown from 41.7% a decade earlier (2010). Rwanda witnessed the largest growth in the sector, with assets worth 33.7% of GDP in 2020 up from 13.8% in 2010. Uganda recorded modest growth from 14.9% of GDP in 2010 to 21.1% in 2020; while Tanzania's banking sector shrank marginally to 17.9% of GDP in 2020 from 18.1% in 2010. For Ethiopia, the most recent data also report rapid growth from 16.4% of GDP in 1995 to 23.6% in 2008. Expectedly, the expansion in the region's banking sector has been accompanied by increasing return on assets, as **Figure 1** shows.

1. The overall relationship is a lot more intricate. Business cycle fluctuations affect the performance of real sectors and hence the creditworthiness of borrowers, which may, in turn, affect the performance and stability of the financial sector (Zabavnik & Verbi, 2021). Thus, an analysis of this nature must control for potential endogeneity in the relationship.

2. Federal Reserve Bank of St. Louis.

Figure 1: East Africa – Banking sector and the real economy, 2022



However, the pace of growth in real GDP per capita does not appear commensurate with the rapid change in the size of the banking sector, growing from about USD 445 in 2010 to 811 in 2020 for Ethiopia, the least advanced sampled economy; and from about USD 1342 in 2010 to 1616 in 2020 for Kenya, the most developed economy in the region by GDP. Importantly, despite the banking sector's fairly large size relative to the countries' economies, there is an apparent disconnect between its performance and the productivity of the region's real sectors. The weak relationship is further illustrated in **Figure 1**, which plots 2022 data. As the figure illustrates, there is an apparent negative relationship between banks' aggregate return on average equity (ROAE) and real sector productivity, represented by manufacturing value added (correlation: -0.14), services value added (-0.44) and agriculture value added (-0.20), all expressed as a percent of GDP. Furthermore, banks' return on average assets (ROAA) appears negatively correlated with agriculture value added (-0.84), positively correlated with manufacturing value added (0.70), and shows no discernible relationship with services value added (0.06).

Thus, the relationship between banking sector performance and real sector productivity not only appears to reflect sectoral heterogeneity but also to depend on the proxy used for banking sector performance. These observations raise several fundamental questions. (1) What is the nexus between banking sector performance and real sectors' productivity? (2) What inform(s) the basic relationship between banking sector performance and productivity of real sectors? (3) Through which channels do banking sector performance affect real sector productivity, if at all? We attempt answers to these questions in the context of the East African region, where, as observed, the nature of the nexus is not clear, and an empirical investigation has not been conducted in the literature. We run our empirical tests on a panel of five countries (Ethiopia, Kenya, Rwanda, Tanzania, and Uganda) sampled on the basis of data availability.

In the literature, the evidence on the bank-real economy nexus appears mixed with some studies showing negative effects running from banks to the real economy (e.g., Cecchetti & Kharoubbi, 2019; Gerali, Neri, Sessa, & Signoretti, 2010), others showing positive effects (e.g., Lucchetti et al., 2001); while some argue that causality may run from the real economy to the banking sector (Zabavnik & Verbi, 2021). Further, many studies in the literature simply establish a correlation between the two sectors without interrogating the possible channels of transmission between them (Chang, Jia, & Wang, 2010). An understanding of the linkages between bank performance and productivity of real sectors is critical for the East African region where small businesses especially in the extractive sectors often regarded as highly risky by formal lenders (see e.g., Kodongo, 2018), command a large share of the economy. For example, a recent USAID report[3] documents that the agriculture sector employs more than 40% of the total population and more than 70% of the population in rural areas.

We document several interesting results. Broadly, bank profitability is negatively related to productivity growth (proxied by log-change in the value added per capita) in the manufacturing and services sectors but has no discernible relationship with productivity growth in the agriculture, fisheries and forestry sector. The latter finding can be explained by the neglect of the agriculture sector by commercial banks, which regard the sector as riskier than other sectors due to its exposure to seasonal forces (Kodongo, 2018). In more specific terms, our results show that a unit increase in banks' return on assets lowers productivity growth by about 5 percentage points [***i.e., exp (-0.052)-1***] in the manufacturing and services sectors. A similar change in the return on equity lowers productivity growth by about 1 percentage point in both sectors.

Interestingly, we find that an increment of 1 unit in banks' cost efficiency (cost-to-income ratio) raises productivity growth in the manufacturing sector by 0.7 percentage points. This finding appears consistent with arguments in the Schumpeterian model (Schumpeter, 1934: 95) that "better functioning banks improve resource allocation and accelerate total factor productivity growth" (Lucchetti et al., 2011). That is, our finding here appears to indicate that efficiency gains in the banking sector would be beneficial if the cost savings could be passed through to real sectors, for instance, in the form of lower noninterest charges. Speaking of which, our results also show that noninterest charges are the more effective channel through which the negative effects of bank profitability are transmitted to real sector productivity. Depending on the profitability measure, noninterest channel accounts for between 1 and 15% in the manufacturing sector, and between 2% and 29% in the agriculture sector, of the negative effects of bank profitability on sectoral productivity growth. Contrarily, we find that the interest channel transmits positive effects of bank profitability, of between 0.5% and 29%, to productivity growth in the services sector, implying that banks possibly find it easier to price risk in the sector given its lower exposure to both seasonal and cyclical risk.

3. USAID report on Kenya's agriculture, food, and water security, 2013.

2.0 Hypotheses development

2.1 Stylized facts

A strand of theoretical literature typified by Bernanke & Gertler, (1989) and Kiyotaki & Moore (1997) explore the effect of frictions such as information asymmetry on entrepreneurs' ability to raise capital. Kiyotaki & Moore (1997) model a dynamic economy in which durable assets (e.g., land) serve as factors of production and as collateral for credit. In such a world, a feedback relationship exists in which collateralized asset prices affect borrowers' credit limits, while credit limits also affect prices of such assets. In this regard, the dynamic interaction between credit limits and collateralized asset prices is a key transmission mechanism by which the real effects of financial market shocks persist, and cascade.

Bernanke & Gertler (1989) develop a theoretical model that attributes linkages between the financial and real sectors to agency costs (e.g., lender monitoring), which vary in response to borrower (firms and households) net worth. Agency costs increase in recessions when borrower net worth (and creditworthiness) falls and fall in booms when borrower net worth rises. Agency costs also respond to borrower creditworthiness shocks, such as debt deflation that reduces the values of borrower collateral, which are independent of shocks to economic output. Therefore, in an environment with agency costs, shocks to borrower net worth and concomitant changes in agency costs (in the financial sector) lead to investment fluctuations and cyclical persistence (real sector) that affect aggregate supply and aggregate demand. Some of the more recent studies speak directly to the role of the banking subsector (Ferri, Murro, Peruzzi, & Rotondi, 2019).

The empirical implications of many of these theoretical proposals have been examined by a litany of studies that explore them using various aspects of the financial system such as monetary policy and interest rates (e.g., Harvey, 1997; Lapp, 1997) financial development (e.g., Arcand, Berkes, & Panizza, 2015; King & Levine, 1993; Rajan & Zingales, 1998), secondary markets (e.g., Gilchrist & Zakrajšek, 2012), and primary markets (e.g., Paglia & Harjoto, 2014). Given our study's focus, our core empirical review is bent toward studies that have related one segment of the financial markets – the banking sector – to the real economy. The

interesting study of Gerali, Neri, Sessa, & Signoretti (2010) sought to ascertain, among others, the role of banks in moderating the transmission of monetary shocks. They find that through sticky bank rates, which delay the impact of policy rate changes on consumption and investment, bank intermediation attenuates the response of output to monetary policy shocks; however, banks also act as a channel through which factors that push up the cost of credit, or lower credit availability to the private sector, may propagate negative shocks to output.

Cecchetti & Kharoubbi (2019) examine the nexus between credit growth and growth in real output. Their model, build on the assumption that riskier projects yield higher average rates of return and entrepreneurs' project choices depend on their current and future abilities to borrow, and predicts that entrepreneurs choose safer and less productive projects in times of fast growth in credit, which slows the real output. The study's empirical tests fail to refute their postulations, documenting a robust negative nexus between credit growth and growth in the real economy, with causality running from the financial sector to the real sectors.

For developing countries, Chang, Jia, & Wang (2010) test the effect of centralized fund reallocation to regions, by four dominant banks in China, on regional economic performance; they find no relationship between the two variables and between bank loans in general and economic growth; however, these relationships are time-varying with a sample of more recent years showing a weak positive relationship, which they attribute to China's market-oriented reforms of the banking sector. And in a recent panel study of ASEAN, Ho & Saadaoui (2022) document a non-linear relationship between bank credit and economic growth in which an expansion in bank credit induces economic growth up to a threshold level of 96.5% (credit-to-GDP ratio)[4] beyond which the effect is insignificant but positive. The results suggest that finance has a diminishing effect on economic growth in the region. Guided by the findings of the foregoing studies, we formulate the first hypothesis for the study:

Hypothesis 1: ***There is a negative relationship between bank profitability and real sector productivity.***

Ahn & Sarmiento (2019) recently attempt to identify the impact of bank liquidity shocks on real economic activity in Colombia. Exploring letters of credit as a channel of transmission to import transactions during the 2008/2009 global financial crisis, they find that adverse bank liquidity shocks play a significant role in the weak performance of Colombia's import sector. Arguing that efficiency metrics captures banks' allocative functions better than volume-based metrics (e.g., credit to deposits ratio), Lucchetti, Papi, & Zazzaro (2001) explore the linkages between bank efficiency (proxying bank development) and real output growth; they provide strong evidence that

4. This is akin to the "vanishing effect of financial depth" evidence documented by Arcand et al. (2015), in which the effect of finance on economic growth begins to diminish beyond the 100% financial depth (credit to the private sector as a proportion of GDP) threshold. Aizenman, Jinjarak, & Park (2015) also document an inverted-U relationship between financial depth and sectoral growth in some sectors and a negative impact of financial depth on output growth of other sectors in developing Asia and Latin America. .

bank development promotes real economic growth. Following these results, we formulate the study's second objective as follows:

Hypothesis 2: ***There is a positive relationship between bank efficiency and real sector productivity.***

Finally, it is also important to acknowledge evidence suggesting that causality may run from the real economy to the banking sector: in a recent study, Obiora et al. (2022) shows that economic development (GDP) has an effect on commercial bank lending, bank lending rates, domestic credit to the private sector, and nonperforming loan portfolios, of banks in Sub-Saharan Africa and in some developed economies. In sum, the literature on the nexus between banks and the real sector is extensive, with most studies proxying the banking sector by variables such as credit growth and cost of credit and private sector lending. The literature has, however, tended to ignore the possible linkages between the accounting performance of banks and real sector productivity. This is the gap that our study seeks to fill. Accounting performance is important because bank managers' incentives, and hence decisions, are built around it. Such decisions impact banks' contractual relationships with real sector firms and, by extension, alignment of objectives between the banking sector and the real sectors that they finance.

2.2 Transmission mechanisms

Suppose that banks were the only source of enterprise finance. Thus, as argued, banks' allocation role, if done efficiently, should optimize real sector production. That is, if banks allocate the pool of accumulated resources to deficit appropriators (innovative enterprises) at a price (lending rate) that reflects no more than the fair price of the enterprises' risk and lenders' normal profit, holding constant frictions such as transaction costs and taxes, aggregate investment increases as the net present values of more of enterprises' available investment opportunities turn positive. Thus, by efficiently conducting their resource accumulation and resource allocation roles, banks' interest rate margin is optimized[5], and they earn a "normal" profit on their intermediation activities and facilitate the maximization of real sectors' output.[6] In this regard, we argue that bank performance (e.g., profitability) affects real sector productivity[7] through the interest margin (see e.g., Fredriksson & Moro, 2014). We refer to this relationship as the interest rate channel.

5. Our argument here is simplified to facilitate the discussion. More rigorous treatments of the interest margin can be found in several classic papers such as T. S. Y. Ho & Saunders (1981), who show that an interest margin is the result of transactions uncertainty faced by the bank and other factors including the degree of managerial risk aversion, the size of a bank's transactions, bank market structure, and the variance of interest rates.

6. The interest margin is an important component of bank profitability. For computing profitability, Demirgüç-Kunt & Huizinga (1999) emphasizes the distinction between ex-ante and ex-post interest margins, with the latter defined as the difference between a bank's actual interest revenue and actual interest expenses, taking into account any loan defaults. Using this measure, they investigate the extent to which the interest margin is affected by taxation, the structure of the financial system, and financial regulations, such a s deposit insurance and document interesting findings.

7 The overall relationship is a lot more intricate. Business cycle fluctuations affect the performance of real sectors and hence the creditworthiness of borrowers, which may, in turn, affect the performance and stability of the financial sector (Zabavnik & Verbi, 2021). Thus, an analysis of this nature must control for potential endogeneity in the relationship.

Hypothesis 3: ***The interest rate margin plays an important mediation role in the relationship between banks' profitability and to real sector productivity in East Africa***

Another channel through which the performance of banks can affect the productivity of real sectors is non-interest income (fees, commissions, loan closing/initiation costs, currency spreads, and the like). For example, banks may charge higher loan closing fees to increase the yield on a loan when there are frictions in the market such as lending rate caps that restrict their ability to appropriately price credit risk (see e.g., Ostas, 1976), or due to market forces such as increased competition, or low credit demand, that artificially restricts their ability to charge appropriate interest rates on risky borrowers' successful loan applications. Loan closing fees reduce the net proceeds on a loan to enterprises and households, possibly compelling them to spend less than the optimum amount on their planned investment or consumption. Thus, by increasing loan yields, closing fees improve banks' performance but may reduce enterprise performance/productivity and lower the welfare of household credit consumers.

Hypothesis 4: ***Noninterest charges of banks mediate the relationship between banks' profitability and to real sector productivity in East Africa***

Understanding transmission mechanisms between bank performance and the real sectors is important for East Africa, where lending rates on personal loans and on loans to perceived riskier sectors (such as agriculture and micro, small and medium enterprises, MSMEs) are often sticky downwards (Nampewo, 2021), bank borrowing rates often low, and the banking business environment characterized by information asymmetry (Boateng, Asongu, Akamavi, & Tchamyou, 2018). Indeed, wide interest spreads were partly responsible for Kenya imposing caps on banks' lending and borrowing rates between 2016 and 2019. Through this policy, the government hoped to address pervasive "bad banking" practices (Friedman, 1970) then considered to impede savings, and to induce greater allocation of credit to younger, riskier sectors, the government's intention being to realize improved capital formation, growth in private sector credit, and economic expansion (Alper, Clements, Hobdari, & Moya, 2020).

Such frictions however have the ability to distort the market mechanism (Jaffee & Russell, 1976) and, predictably, banks responded to the restrictions by rationing credit to various private sectors, increasing lending to the public sector (Safavian & Zia, 2018), and changing their borrowing terms by setting higher threshold rolling account balances on which interest could be earned by household savers. In the process, bank profits were smoothed while many real sectors of the real economy were starved of credit (Alper et al., 2020), and potentially suffered productivity losses. These observations raise the prospects that bank performance may not be aligned to the productivity of real sectors.

3.0 Methodology and data

3.1 Baseline analysis

Economic theory postulates high levels of interdependency between the financial sector and the real economy (Benhabib, Liu, & Wang, 2019; Bond, Edmans, & Goldstein, 2012) especially during crises (Bernanke, 2018; Bond et al., 2012; Kaminsky & Reinhart, 1999). Although the typical study has tended to link this complex relationship to monetary policy (Borio & Zhu, 2012; Gertler & Karadi, 2015), other studies demonstrate that innovations in the financial sector that are, in some cases, exogenous to monetary policy may also affect the real economy (Guiso, Sapienza, & Zingales, 2004; Jokipii & Monnin, 2013). Our study conceptually leans towards the latter set of studies. Our baseline analysis exploits the estimation of the following empirical specification:

$$y_{i,t} = \beta_0^s + \beta_1 y_{i,t-1}^s + \beta_1 y_{it} + \beta_2 \pi_{it} + \beta_3 x_{it} + \eta_i + \theta_t + \varepsilon_{ti} \quad (1)$$

where $y_{it} = ln(y_{it}) - ln(Y_{i,t-1})$, $y_{it} = ln(Y_t)$, such that Y^s is the per capita value added by sector s in US dollars; Y is GDP per capita; π is the measure of bank performance as a percentage of a well-understood balance sheet metric; x is a vector of control variables; η_i and θt respectively represent cross-sectional fixed effects and time effects; and ε is the error term. We add the lagged dependent variable to minimize possible endogeneity arising from simultaneity between GDP per capita and sectoral value added as well as to control for momentum in real sector productivity. Thus, we estimate **Equation (1)** using the standard fixed effects procedure in the first instance. The fixed effects procedure allows us to control unobserved country-level developments that may not be explicitly modelled. The method is also preferred as it offers an opportunity to mitigate the omitted variables problem. However, because the method and adding a lagged dependent variable do not eliminate the endogeneity problem which may arise, in the current study, from both the omitted variables and possible cross-causality, we also use the instrument variable (IV) estimation.

We control for potential channels through which the real sectors interact with banks; in particular, following Lucchetti et al. (2001), we include a credit channel variable, namely, bank credit to the private sector as a proportion of total credit to the private sector. Consistent with the economic growth literature (e.g., Acemoglu, Gallego, & Robinson, 2014), we also include a measure each of human capital,

proxied by Mo Ibrahim's human development index, and institutional quality, proxied by an index of regulatory quality (ability of government to formulate and implement sound policies and regulations that promote private sector development). Following Nanivazo, Egbendewe, Marcelin, & Sun (2021), we control for macroeconomic stability (inflation, proxied by log difference in consumer price indexes), and trade openness (total external trade divided by GDP), which can affect firm performance because of reduced consumer purchasing power (inflation) and by availing the firm of external markets for its produce, or intensifying product market competition due to foreign firms' entry (trade openness).

Finally, we include a "Kenya" variable to capture the financial sector-real sector effects for Kenya, our main country of interest. The Kenya variable is constructed by first defining a dummy variable that takes the value of 1 when the country is Kenya and 0 elsewhere; then multiplying the dummy by the relevant bank performance metric.

3.2 Channels

As indicated, we hypothesize two channels of transmission of bank performance to the real sector performance: interest rates and noninterest income. We test each of the two channels in this section by re-estimating **Equation (1)** using the component of bank performance explained, $\hat{z}$, respectively, by interest income on loans (as a percentage of average gross customer loans and advances), and noninterest income (as a percent of revenues), and a constant.[8] That is, we estimate the following specification.

$$y_t = \beta_0^{s,h} + \beta_1 y_{t-1}^{s,h} + \beta_1 y_t + \beta_2 z^t + \beta_3 x_t + \eta_i + \theta_t + \varepsilon_t \quad (2)$$

In the context of our discussion, is understood as the extent to which banks "extract" from their customers using the interest spread and yield-increasing commissions and fees. We expect , the coefficient of , to be negative and significant if credit is unfairly priced and if noninterest income is used by banks to realize monopoly profits by increasing yields beyond banks' normal profit. Like Equation (1), we also estimate this empirical model using the fixed effects procedure.

3.3 Data

We measure bank performance using several aggregated proxies including banks' return on average assets, return on average equity, return on equity constructed from reporting banks' income before tax, and cost-to-income (or efficiency) ratio.[9]

8. We start by estimating the equation $y_{i,t} = \hat{\beta}_0 + \hat{\beta}_1 \pi_{it} + \varepsilon_{ti}$ using the OLS method. We then extract the explained component, $\hat{z}_{it} = \hat{\beta}_0 + \hat{\beta}_1 \pi_{it}$, $of\, y_{\hat{z}_t}$, which is what we use as the explanatory variable in **Equation 2**.

9. The literature has proposed several alternative bank efficiency perspectives. First is *scale efficiency* (Farell, 1957) defined as the relationship between a bank's per unit average production cost and volume. That is, if a firm is not at the optimal long-run scale of operation, i.e., constant returns to scale, the firm can hypothetically produce its current level of output with fewer inputs when constant returns to scale is attained (Aly, et al, 1990). Second, is *allocative efficiency*, which speaks to the banks choice of an optimal set of input from a given set of input prices (see e.g., Aly et al., 1990). Third, is cost *efficiency*, the ability of a bank to provide services without wasting resources as a result of technical or allocative inefficiency. Finally, the term *technical efficiency* is used in the broad sense to refer to the difference between observed quantity of input and output variables with respect to optimal quantity of input and output variables (Alber et al., 2019).

The data for banks are obtained from Bank Focus, which reports them directly from the source banks' financial statements. We perform the analysis at the sectoral level for the real sectors. The productivity of real sectors is measured using sectoral value added per capita. We control a number of potential macroeconomic factors that can affect the underlying relationship between the financial and real sectors. The control variables include gross domestic product (GDP) per capita, credit to the private sector by banks, human development index, Consumer Price Index (CPI) inflation, trade openness (constructed as total trade as a proportion of GDP), and a measure of state governance, regulatory quality. The sectoral data and data on all the control variables (other than the human development index, which is obtained from the Mo Ibrahim Foundation's website, are sourced from World Bank's World Development Indicators. The variables are discussed in detail and motivated in **Section 3.2**. a full definition of variables and sources of data is presented in **Table A1** of the **Appendix**.

The study is executed through a panel regression on five East African countries (Ethiopia, Kenya, Rwanda, Tanzania, and Uganda, chosen on the basis of data availability) using annual data for the period 2014–2022, the longest period for which aggregated bank performance data are available on Bank Focus. The panel is unbalanced. **Table 1** reports the summary statistics. The mean value added for the three broad economic sectors in the East African region ranges from approximately USD 84 [i.e., exp (4.43)] per capita for manufacturing to approximately USD 428 [exp (6.06)] for Services. These production efforts are generally low compared to those of most developing countries even within Sub-Saharan Africa, where, South Africa, for example, reports an average for the period of USD 740 in manufacturing value added per capita for the same period.

Table 1: Summary statistics

	Obs.	Mean	Std. dev.	Min	Max
Manufacturing value added, per capita (log)	45	4.43	0.53	3.10	5.10
Services value added, per capita (log)	45	6.06	0.45	5.40	7.05
Agriculture[1] value added, per capita (log)	45	5.53	0.27	5.14	6.10
Banks' return on average equity (%)	45	15.61	8.67	-2.88	43.79
Banks' returns on average assets (%)	45	2.05	0.79	-0.45	3.17
Banks' return on equity, using PBT[2] (%)	45	20.90	10.42	1.06	54.72
Banks' interest income on loans[3] (%)	45	11.86	2.65	3.20	17.01
Banks' noninterest income[4] (%)	45	29.82	4.80	20.41	45.35
Banks' cost-to-income (efficiency) ratio (%)	45	56.41	10.25	33.91	76.43

	Obs.	Mean	Std. dev.	Min	Max
Gross domestic product per capita (log)	45	6.90	0.34	6.32	7.65
Credit to private sector by banks (% of GDP)	34	20.51	8.56	12.30	36.65
Human development index	45	55.17	5.05	47.10	63.70
Regulatory quality (index)	40	-0.43	0.36	-1.10	0.19
Consumer price inflation (%)	44	6.41	4.70	-0.39	23.78
Trade openness (% of GDP)	45	38.15	9.16	24.01	60.38

[1] Includes Forestry and Fishing. [2] Profit and loss before taxes. [3] Expressed as a percentage of average gross customer loans & advances. [4] Expressed as a proportion of operating revenues.

Comparatively, banks' return on average equity averages 15.61%, the interest income on loans stands at almost 12% of average customer loans and advances, and the noninterest income averages almost 30% of operating revenues. With the exception of the return on equity, whose standard deviations are quite high, reflecting greater variability across countries, the variability of the rest of the performance metrics is generally low. This shows a tendency for East African countries to cluster around a central value, making them good candidates for panel analysis. Judging by these numbers alone, a pattern begins to emerge in which East African banks' performance does not appear to reflect quite closely in the performance of the economies' real sectors, which they fund. This reinforces the question raised in this paper regarding the possible lack of fairness in the pricing of banks' products and/or costing of services and its possible adverse consequences on real sector productivity.

On the control variables, the average GDP per capita is USD 992, over the study period, confirming the low-income classification of the bulk of the countries in the sample.[10] Credit to the private sector by banks averages a paltry 21% of GDP, again indicating that banks are possibly rationing credit to most sectors, choosing to deal only with the least credit risk clients who must, however, pay heavily to access the credit (given the high interest income on loans discussed earlier). One of the factors that may explain a "highly priced" banking products and services banks' confidence, or lack thereof, in the enforcement of contracts in their country of operations. Thus, we use a state governance variable – regulatory quality – to have some understanding of the environment of banks' operations in East Africa: the negative average value for the region[11], and a low standard deviation showing that most countries in the sample are indeed on the negative side, indicates possible weak enforcement of regulations and contracts in the region; this increases "global" risk, attracting a high (sovereign) premium loading on credit for all borrowers.

10 Kenya and Tanzania are classified as lower middle-income economies while Ethiopia, Rwanda, and Uganda are low-income economies. See the data and definitions on the World Bank website (accessed 04.09.2023).

11 The variable ranges from -2.5 (worst governance) to +2.5 (best governance).

Table 2 reports the pairwise correlations for the explanatory variables used in the study. There is an expectedly high correlation between the bank performance variables with the two return-on-equity metrics, for example, reporting a correlation of 98%. The high correlations justify our empirical approach in which such variables enter the equation interchangeably. Surprisingly but interestingly, the operating efficiency metric is very strongly negatively correlated with most of the return measures, suggesting the possibility that banks' high returns (see **Table 1**) are not as a result of their efficient operations but the result of unfair intermediation practices in which banks operate with unjustifiable operating costs (e.g., excessive executive compensation) while customers are unduly burdened by interest and noninterest charges to cover those costs. In general, the correlations are low, providing no reason to suspect multicollinearity in the estimated model.

Table 2: Correlations

	1	2	3	4	5	6	7	8	9	10	11	12
Banks' return on average equity	1.00											
Banks' returns on average assets	0.72	1.00										
Banks' return on |equity, using PBT[1]	0.98	0.68	1.00									
Banks' interest income on loans[2]	-0.30	-0.09	-0.37	1.00								
Banks' noninterest income[3]	0.35	0.32	0.38	-0.14	1.00							
Banks' cost-to-income (efficiency) ratio	-0.82	-0.76	-0.81	0.47	-0.38	1.00						
Gross domestic product per capita	-0.15	0.20	-0.12	-0.13	0.32	-0.23	1.00					
Credit to the private sector, by banks	0.35	0.27	0.41	-0.42	0.10	-0.62	0.74	1.00				
Human development index	-0.15	-0.48	-0.09	-0.45	-0.26	0.18	-0.42	-0.04	1.00			
Regulatory quality	-0.66	-0.26	-0.67	0.25	-0.51	0.53	0.07	0.19	0.16	1.00		
Inflation	-0.10	0.13	-0.11	0.16	0.04	0.09	-0.15	-0.40	-0.26	0.03	1.00	
Trade openness	-0.22	-0.13	-0.20	-0.16	-0.51	0.18	-0.32	0.07	0.44	0.69	0.15	1.00

4.0 Empirical results

4.1 Baseline analysis

The first set of baseline empirical tests results are presented in Tables 3, 4, and 5. We start our analysis from the broad relationships of interest for East Africa. In Table 3 and Table 4, the results show a negative and largely significant relationship between the banking sector performance and real sector productivity in the region. An increment of 1 unit (i.e., 1 percentage point) in the return on average bank assets, for instance, elicits a 5 % [i.e. exp (-0.052)-1,] reduction in productivity growth (log change in value added per capita) in the manufacturing sector and in the services sector, while a 1-unit increment in the return on average equity of banks elicits 1% [[exp (-0.010)-1] and 0.9% [exp (-0.009)-1] reduction, respectively, in productivity growth of the two sectors.

A more stable measure of performance for banks' equity capital providers is the return on equity using earnings before taxes because it captures the effort and decisions of banks' managerial team while excluding the effects on income of exogenous effects of government's tax choices. Thus, the effect of this return metric yields a more appropriate indicator of bank managers' decisions on the productivity of real sectors. The results show that an increment in this metric by 1 unit is associated with a fall in real sector productivity of approximately 0.7% and 0.8%, respectively, for manufacturing and services sectors.

Table 3: Fixed effects results for the Manufacturing sector

Dependent variable: change in manufacturing value added per capita				
	(1)	(2)	(3)	(4)
Lagged dependent variable	-0.133 (0.186)	-0.129 (0.189)	-0.136 (0.206)	-0.171 (0.179)
Banks return on average equity	-0.010* (0.003)			
Banks return on average assets		-0.052* (0.019)		
Banks' return on equity (using PBT)			-0.008* (0.003)	
Cost-to-income (efficiency) ratio				0.007* (0.003)

Dependent variable: change in manufacturing value added per capita				
	(1)	(2)	(3)	(4)
Kenya[§]	0.001 (0.012)	-0.006 (0.074)	0.004 (0.010)	-0.007 (0.010)
GDP per capita	0.967* (0.352)	0.953* (0.341)	0.844 (0.404)	0.978* (0.398)
Credit to private sector by banks	0.006 (0.010)	0.003 (0.009)	0.006 (0.010)	0.016 (0.015)
Human development index	-0.004 (0.014)	-0.007 (0.012)	0.006 (0.013)	-0.006 (0.029)
Regulatory quality	0.440 (0.272)	0.462 (0.282)	0.432 (0.342)	0.405* (0.146)
Inflation	0.001 (0.008)	0.002 (0.008)	0.001 (0.007)	0.005 (0.006)
Trade openness	0.016* (0.006)	0.016* (0.007)	0.015 (0.008)	0.011* (0.004)
Constant	-7.04** (1.84)	-6.65** (1.89)	-6.61* (2.49)	-7.48** (1.49)
Country fixed effects	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes
R-squared	0.01	0.02	0.01	0.01

PBT is profit/loss before tax. *, $p < 0.1$; **, $p < 0.05$; ***, $p < 0.01$. Standard errors in parentheses.

The effects are mute for the agriculture, forestry and fishing sector (see **Table 5**). This is not surprising. To illustrate, Central Bank of Kenya's (CBK) Annual Supervision Report 2022 documents that the country's agriculture sector had one of the lowest allocations of commercial bank credit, accounting for only about 2.4% of total credit.[12] Given such a noticeable neglect of the sector by banks, which speaks to (a possibly erroneous) information about the sector's financing risk, it is not unreasonable to expect that the productivity of potentially the most important extractive sector[13] in the East African economy would not be closely linked to bank profitability.

This result is consistent with previous studies' (e.g., Kodongo, 2018), which document strong negative effect of banking regulations (e.g., capital adequacy requirements) on lending to the agriculture sector in Kenya and show that credit allocation policies of banks with larger market power (proxied by the Lerner index) tend to ignore the agriculture sector.

12 Kenya and Tanzania are classified as lower middle-income economies while Ethiopia, Rwanda, and Uganda are low-income economies. See the data and definitions on the World Bank website (accessed 04.09.2023).

13 The data from World Development Indicators, used for this study, indicate that agriculture, fisheries, and forestry contributed (an average of) 26.4% of the GDP of the five sampled countries during 2022.

Since banks with larger market shares tend to shape the aggregate banking sector's profitability, the sector's performance must be uncorrelated with the agriculture sector's productivity.

Table 4: Fixed effects estimation results for the Services sector

Dependent variable: change in services value added per capita				
	(1)	(2)	(3)	(4)
Lagged dependent variable	0.071 (0.073)	0.080 (0.074)	0.021 (0.153)	-0.145 (0.094)
Banks return on average equity	-0.009** (0.002)			
Banks return on average assets		-0.052*** (0.007)		
Banks' return on equity (using PBT)			-0.007** (0.002)	
Cost-to-income (efficiency) ratio				0.001 (0.002)
Kenya	0.018* (0.007)	0.105* (0.040)	0.055 (0.041)	-0.005 (0.009)
GDP per capita	0.762 (0.383)	0.768 (0.352)	0.865* (0.325)	-0.381 (0.308)
Credit to private sector by banks	0.015** (0.004)	0.012** (0.004)	-0.021* (0.007)	-0.001 (0.008)
Human development index	-0.002 (0.012)	-0.006 (0.011)	-0.017 (0.020)	-0.002 (0.017)
Regulatory quality	0.129 (0.177)	0.125 (0.172)	0.177 (0.162)	0.268 (0.258)
Inflation	-0.012** e(0.002)	-0.011** (0.002)	-0.005 (0.002)	0.013** (0.003)
Trade openness	0.014** (0.003)	0.013** (0.003)	0.010 (0.005)	-0.008** (0.002)
Constant	-5.903* (1.995)	-5.601* (1.817)	-5.003* (1.980)	3.111 (1.934)
Country fixed effects	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes
R-squared	0.15	0.16	0.15	0.01

PBT is profit/loss before tax. *, $p < 0.1$; **, $p < 0.05$; ***, $p < 0.01$. Standard errors in parentheses.

The cost-income ratio, a measure of banks' operational efficiency, report mixed findings. The efficiency metric is positively and significantly related to the manufacturing sector's value added per capita (**Table 3**). A plausible implication of this finding is that an efficient banking sector can pass through its operational efficiency benefits to borrowers in the manufacturing sector (for instance, in the form of

lower fees on services), which can in turn exploit the resulting savings to magnify the positive effect of borrowed capital on their productivity. The bank efficiency measure does not, however, appear to have any discernible effects on the productivity of services (**Table 4**) and agriculture (**Table 5**) sectors.

Table 5: Fixed effects estimation results for the Agriculture, Fisheries, and Forestry sector

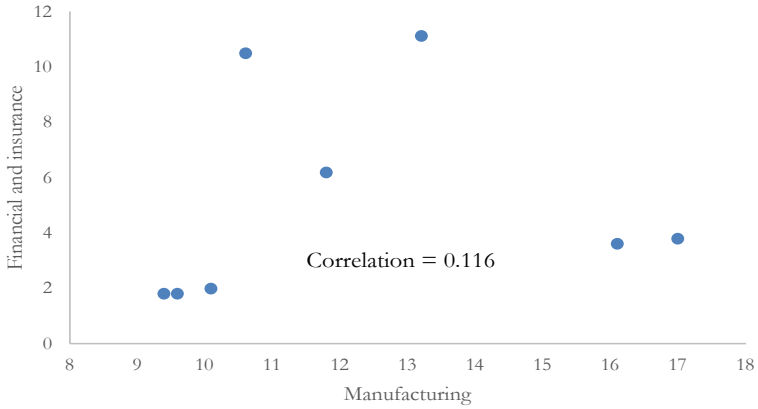
Dependent variable: change in services value added per capita				
	(1)	(2)	(3)	(4)
Lagged dependent variable	-0.145 (0.094)	-0.148 (0.093)	-0.159 (0.086)	-0.097 (0.061)
Banks return on average equity	0.001 (0.002)			
Banks return on average assets		0.008 (0.010)		
Banks' return on equity (using PBT)			0.001 (0.002)	
Cost-to-income (efficiency) ratio				-0.002 (0.001)
Kenya	-0.005 (0.009)	-0.031 (0.058)	-0.004 (0.007)	0.013* (0.005)
GDP per capita	-0.381 (0.308)	-0.381 (0.304)	-0.355 (0.336)	-0.350 (0.277)
Credit to private sector by banks	-0.001 (0.008)	0.000 (0.007)	0.001 (0.007)	-0.008 (0.007)
Human development index	-0.002 (0.017)	-0.001 (0.016)	-0.001 (0.018)	-0.016 (0.019)
Regulatory quality	0.268 (0.258)	0.271 (0.270)	0.292 (0.307)	0.042 (0.111)
Inflation	0.013** (0.003)	0.013** (0.003)	0.013** (0.003)	0.013*** (0.002)
Trade openness	-0.008** (0.002)	-0.008* (0.003)	-0.008* 0.003)	-0.009*** (0.001)
Constant	3.111 (1.934)	3.036 (1.958)	2.853 (0.260)	3.731* (1.293)
Country fixed effects	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes
R-squared	0.01	0.01	0.01	0.30

PBT is profit/loss before tax. *, $p < 0.1$; **, $p < 0.05$; ***, $p < 0.01$. Standard errors in parentheses.

As mentioned, the foregoing discussed relationships speak broadly to the East African region. Yet, since Kenya, being the most developed economy in the region by GDP per capita, and with the largest banking presence[14] in the region, it is interesting to establish whether the relationships identified equally apply to it. The result show (**Table 3**) that, regardless of the measure of bank performance used, there is no relationship between the performance of the banking sector and the productivity of the manufacturing sector. This finding is consistent with anecdotal evidence and with intuition: **Figure 2** reports estimates of recent GDP growth rates for the two sectors – financial and manufacturing – reported in CBK's recent Annual Supervision Report 2022. The data, for the period 2021 and 2022, are observed on a quarterly frequency. Consistent with our results, the figure shows weak interdependence in the real GDP growth rates (performance) of the two sectors with a correlation coefficient of only 0.116! Elsewhere, the relationship between bank performance and sectoral value added is positive when significant, for Services (**Table 4**, columns 1 and 2) and for Agriculture (**Table 5,** last column), suggesting complementarity between the banking and real sectors. Thus, our baseline results suggest heterogeneity at the country and sectoral levels in the elasticities of East Africa's real economies to banking sector performance.

Of the control variables, trade openness appears to report the most interesting and intuitively appealing findings. It is largely positive and significant for

Figure 2: Scatter graph of manufacturing and financial sector growth, Kenya 2021-22



Data source: Central Bank of Kenya, 2022

14. According to data from World Development Indicators, Kenya's GDP per capita for 2022 was approximately USD 2099, compared to its closest "rivals" in the region, Ethiopia (USD 1028) and Tanzania (USD 1192). Kenya also dominates the East African region's banking industry, reporting the highest number in the top-20 largest banks, according to data from Statista (accessed 04.09.2023).

manufacturing and services productivity (**Table 3** and **Table 4**) and negative and significant for agriculture (**Table 5**). The latter finding can be explained in the context of theoretical propositions made in studies such as Young (1991), which hypothesize that opening up to trade might hurt the economy if it specializes in sectors with dynamic comparative disadvantage. The external trade of East African economies is dominated by extractive sectors with agriculture and minerals playing a key role. In the typical case, exports comprise largely of unprocessed raw materials such as coffee (Ethiopia, Uganda), tea (Kenya, Rwanda), and gold (Tanzania), whose prices are externally determined. The low levels of value addition weaken the competitiveness of the agriculture sector and exposes it to the adverse effects of trade openness. Contrarily, although small relative to the GDPs of these economies, manufacturing and services sectors are better placed to exploit the benefits of external trade which expands their end-markets and broadens their customer base.

4.2 Transmission mechanisms

The results of our empirical tests based on Equation (2) are reported in **Table 6** through **Table 8**. In **Table 6** and **Table 8**, the results report findings that are consistent with the interpretation that the noninterest channel has been used effectively by banks in East Africa to drive their earnings beyond what would be regarded as normal profit, which hurts borrowers. rough which the negative effects of bank profitability are transmitted to real sector productivity. Depending on the profitability measure, noninterest channel accounts for between 1% and 15% in the manufacturing sector, and between 2% and 29% in the agriculture sector, of the negative effects of bank profitability on sectoral productivity growth. The practice of using noninterest income to boost earnings has been rife since the adoption of Basel regulations as banks seek not only to diversify their income sources but also to grow their income while concurrently avoiding excessive risk-taking (e.g., Abedifar et al., 2018). On the average (**Table 2**), noninterest income constitutes almost 30% of East African banks' total revenues. From borrowers' perspective, noninterest income (e.g., loan initiation, or closing, costs; prepayment penalties; and ledger fees) increases the costs of operating an account and servicing credit. When these levies are high, they negatively affect the ability of borrowers to effectively put to use the borrowed capital, resulting in productivity losses.

Table 7, however, documents a different observation for firms in the services sector. The results show that noninterest income cannot be regarded as a channel through which banks' performance affects productivity of the services sector. Rather, we find that the interest channel transmits positive effects of bank profitability, of between 0.5% and 29%, to productivity growth in the services sector. A possible interpretation of this is that firms in the services sector are broadly deemed as less risky than firms in agriculture and manufacturing and are therefore able to access bank credit at less exploitative interest rates. This is plausible if Services firms (e.g., utilities and tech firms) are believed by banks to be less exposed to business cycles and/or seasonal fluctuations such that their abilities to service their obligations do not reflect state-dependency.

The results for Kenya are also mixed, initially documenting no sensitivity to any of the two hypothesized channels (**Table 6**). However, for the

agriculture sector (**Table 8**), the results conform to the East African case, showing the noninterest channel as adversely affecting agricultural productivity whereas in the case of services (**Table 7**), the interest channel, unlike the East African case, is mute, while the noninterest channel is supportive of productivity in the sector.

Table 6: Fixed effects estimation results for the Manufacturing sector

Dependent variable: change in manufacturing value per capita						
	Return on average equity		Return on average assets		Return on equity (using EBT)	
Lagged dependent variable	-0.050 (0.209)	-0.127 (0.088)	-0.050 (0.209)	-0.127 (0.088)	-0.050 (0.209)	-0.127 (0.088)
Interest channel	-0.003 (0.014)		-0.111 (0.514)		-0.002 (0.010)	
Noninterest income channel		-0.028* (0.011)		-0.336* (0.130)		-0.022* (0.008)
Kenya	-0.037 (0.080)	0.019 (0.023)	-1.360 (2.888)	0.232 (0.272)	-0.025 (0.054)	0.015 (0.017)
GDP per capita	0.935 (0.958)	0.972* (0.345)	0.935 (0.958)	0.972* (0.345)	0.935 (0.958)	0.972* (0.345)
Credit to private sector by banks	-0.016 (0.010)	0.007 (0.010)	-0.016 (0.010)	0.007 (0.010)	-0.016 (0.010)	0.007 (0.010)
Human development index	-0.021 (0.017)	-0.016* (0.007)	-0.022 (0.017)	-0.016* (0.007)	-0.021 (0.017)	-0.016* (0.007)
Regulatory quality	0.262 (0.352)	0.541 (0.317)	0.262 (0.352)	0.541 (0.317)	0.262 (0.352)	0.541 (0.317)
Inflation	0.007 (0.004)	0.006 (0.004)	0.007 (0.004)	0.006 (0.004)	0.007 (0.004)	0.006 (0.004)
Trade openness	0.005 (0.016)	0.007 (0.009)	0.005 (0.016)	0.007 (0.009)	0.005 (0.016)	0.007 (0.009)
Constant	-4.887 (4.949)	-5.788* (2.082)	-4.127 (3.107)	-5.581* (2.035)	-4.905 (4.996)	-5.775* (2.079)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.01	0.06	0.11	0.07	0.01	0.06

PBT is profit/loss before tax. *, $p < 0.1$; **, $p < 0.05$; ***, $p < 0.01$. Standard errors in parentheses.

Table 7: Fixed effects estimation results for the Services sector

Dependent variable: change in services value added per capita						
	Return on average equity		Return on average assets		Return on equity (using EBT)	
Lagged dependent variable	0.021 (0.153)	-0.204 (0.160)	0.021 (0.153)	-0.204 (0.160)	0.021 (0.153)	-0.204 (0.160)
Interest channel	0.007** (0.002)		0.272** (0.071)		0.005** (0.001)	
Noninterest income channel		-0.020 (0.009)		-0.244 (0.109)		-0.016 (0.007)
Kenya	-0.056 (0.041)	0.037* (0.016)	-2.016 (1.499)	0.451* (0.188)	-0.038 (0.028)	0.029* (0.012)
GDP per capita	0.865* (0.325)	0.652** (0.128)	0.865* (0.325)	0.652** (0.128)	0.865* (0.325)	0.652** (0.128)
Credit to private sector by banks	-0.021* (0.007)	0.008 (0.009)	-0.021* (0.007)	0.008 (0.009)	-0.021* (0.007)	0.008 (0.009)
Human development index	-0.017 (0.020)	0.005 (0.016)	-0.017 (0.020)	0.005 (0.016)	-0.017 (0.020)	0.005 (0.016)
Regulatory quality	0.177 (0.162)	0.414* (0.145)	0.177 (0.162)	0.414* (0.145)	0.177 (0.162)	0.414 (0.145)
Inflation	-0.005 (0.002)	-0.006* (0.002)	-0.005 (0.002)	-0.006 (0.002)	-0.005 (0.002)	-0.006* (0.002)
Trade openness	0.010 (0.005)	0.011** (0.002)	0.010 (0.005)	0.011** (0.002)	0.010 (0.005)	0.011** (0.002)
Constant	-4.807* (1.675)	-5.058** (1.138)	-4.388** (1.057)	-4.963** (1.083)	-4.818* (1.691)	-5.052** (0.134)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.05	0.15	0.11	0.15	0.05	0.15

PBT is profit/loss before tax. *, $p < 0.1$; **, $p < 0.05$; ***, $p < 0.01$. Standard errors in parentheses.

4.3 Robustness checks

Inclusion of GDP per capita on the right-hand side of **Equation 1** introduces the possibility of simultaneity bias since, for example, higher levels of total factor productivity (proxied by sectoral value added) often cause higher levels of economic growth which may result in faster realization of economic development. Accordingly, parameter estimates from **Equation (1)** may be biased by endogeneity. We address this concern by running a fixed effects instrument variable regression. Thus, we need instrument variables that are both relatively strongly correlated with the endogenous variable (instrument's strength) but uncorrelated with the residual of the regression (instrument's validity). To satisfy these conditions, we are guided by the instrumentation procedure in the System Generalized Method of Moments, and accordingly, use deep lagged values of levels of the dependent variables. We restrict our choice to two lags (lag 2 and lag 3) to avoid the conventional instrument proliferation problem (Roodman, 2009) and to preserve degrees of freedom.

Abridged results of the IV-fixed effects regression are presented in **Table 9.** Save for a little attenuation in the levels of significance of some variables in the manufacturing equation, the results are qualitatively similar, indicating that omitted variables bias, and simultaneity bias, do not affect the relationships of interest. Thus, we can infer that the bank performance in the East African region is negatively related to the productivity of real sectors, particularly manufacturing and agriculture, which generally tend to be exposed to business cycle and seasonal fluctuations and therefore likely to be scored by banks' credit evaluation systems as riskier.

Table 8: Fixed effects estimation results for the Agriculture, Forestry and Fishing sector

Dependent variable: change in agriculture, forestry and fishing value added per capita						
	Return on average equity		Return on average assets		Return on equity (using EBT)	
Lagged dependent variable	-0.150* (0.054)	-0.223** (0.057)	-0.150* (0.054)	-0.223** (0.057)	-0.150* (0.054)	-0.223** (0.057)
Interest channel	-0.005 (0.006)		-0.182 (0.213)		-0.003 (0.004)	
Noninterest income channel		-0.013** (0.002)		-0.160** (0.028)		-0.010** (0.002)
Kenya	0.045 (0.020)	-0.018* (0.006)	1.624 (0.730)	-0.212* (0.075)	0.030 (0.014)	-0.014* (0.005)
GDP per capita	-0.607** (0.165)	-0.190 (0.155)	-0.607** (0.165)	-0.190 (0.155)	-0.607** (0.165)	-0.190 (0.155)

Dependent variable: change in agriculture, forestry and fishing value added per capita						
	Return on average equity		Return on average assets		Return on equity (using EBT)	
Human development index	0.010 (0.007)	-0.006 (0.008)	0.010 (0.007)	-0.006 (0.008)	0.010 (0.007)	-0.006 (0.008)
Regulatory quality	0.281* (0.091)	0.434*** (0.062)	0.281* (0.091)	0.434*** (0.062)	0.281* (0.091)	0.434*** (0.062)
Inflation	0.011*** (0.001)	0.013*** (0.001)	0.011*** (0.001)	0.013*** (0.001)	0.011*** (0.001)	0.013*** (0.001)
Trade openness	-0.006** (0.002)	-0.007*** (0.001)	-0.006** (0.002)	-0.007*** (0.001)	-0.006** (0.002)	-0.007*** (0.001)
Constant	3.603** (0.984)	1.990* (0.792)	3.205** (0.746)	2.153* (0.789)	3.613** (0.991)	2.000* (0.791)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.24	0.10	0.21	0.12	0.23	0.09

PBT is profit/loss before tax. *, $p < 0.1$; **, $p < 0.05$; ***, $p < 0.01$. Standard errors in parentheses.

Table 9: IV-FE abridged regression outputs

Dependent variable: Change in	Manufacturing value added pc				Services value added pc				Agriculture value added pc			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Lagged dependent variable	-0.138 (0.111)	-0.134 (0.112)	-0.151 (0.121)	-0.166 (0.126)	0.041 (0.131)	0.053 (0.123)	0.069 (0.148)	-0.011 (0.148)	-0.138 (0.104)	-0.139 (0.104)	-0.153 (0.102)	-0.096 (0.084)
Banks return on average equity	-0.009* (0.006)				-0.009*** (0.003)				0.002 (0.003)			
Banks return on average assets		-0.051* (0.031)				-0.049*** (0.014)				0.010 (0.017)		
Banks' return on equity (using PBT)			-0.008 (0.006)				-0.008*** (0.003)				0.001 (0.003)	
Cost-to-income (efficiency) ratio				0.007 (0.005)				0.006** (0.002)				-0.002 (0.002)
Kenya	0.002 (0.015)	0.001 (0.097)	0.006 (0.013)	-0.006 (0.020)	0.018*** (0.007)	0.110*** (0.041)	0.018*** (0.006)	-0.013 (0.009)	-0.005 (0.007)	-0.024 (0.045)	-0.003 (0.006)	0.013** (0.006)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.04	0.03	0.01	0.07	0.10	0.11	0.09	0.02	0.01	0.02	0.02	0.43

PBT is profit/loss before tax. *, **, *** respectively refer to statistical significance at 10%, 5% and 1%.

Table 10: Fixed Effects abridged regression outputs – Manufacturing value added

Dependent variable: Change in Country	Return on average equity			Return on average assets			Return on equity (PBT)		
	RWA	TAN	UGA	RWA	TAN	UGA	RWA	TAN	UGA
Lagged dependent variable	-0.137 (0.182)	-0.138 (0.188)	-0.136 (0.191)	-0.134 (0.186)	-0.137 (0.194)	-0.130 (0.197)	-0.131 (0.203)	-0.138 (0.195)	-0.129 (0.209)
Banks return on average equity	-0.012* (0.004)	-0.009* (0.003)	-0.008* (0.003)						
Banks return on average assets				-0.074** (0.021)	-0.048* (0.017)	-0.045* (0.019)			
Banks' return on equity (using PBT)							-0.007 (0.005)	-0.007* (0.003)	-0.007* (0.003)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

PBT is profit/loss before tax. *, **, *** respectively refer to statistical significance at 10%, 5% and 1%. RWA, TAN and UGA respectively mean Rwanda, Tanzania and Uganda.

It is interesting to establish whether the regional results also hold for individual countries in the sample. Thus, for additional robustness checks, we test the extent to which the effects on sectoral productivity are observed at the individual country level. The abbreviated results are reported in Table 10 for the manufacturing sector value added and only with the profitability variables.[15] Ethiopia is used as the baseline case. Except Uganda, which reports similar effects as the region, in the rest of the countries (Kenya's results were reported in the previous sections), our results show that real sector productivity is largely unresponsive to changes in banks' profit performance for the rest of the countries. It is also important to note that the regional results remain qualitatively similar to those reported in the baseline tests.

15 Due to space paucity, results for the other sectors are not reported. They are, however, available from the authors upon request.

5.0 Concluding remarks

5.1 Summary

Anecdotal evidence shows inconsistency in the behavior of bank return metrics compared to indicators of sectoral productivity in East Africa. For example, the 2022 data show that the return on average assets (ROAE) for banks was negatively related to value added per capita of real sectors (see **Figure 1**). Further, ROAA appeared negatively correlated to agriculture value added and positively correlated to manufacturing value added.

These observations raise several questions: What is the nexus between banking sector performance and real sectors' productivity? Are the relationships (if any) between the banking sector and the real sectors similar across sectors? Through which channels, if any, do banking sector profitability affect real sector productivity? An examination of the literature shows that no study has examined the nexus between the performance of banks on the one hand and the real sector productivity on the other hand, for East Africa. Our study sought to attempt answers to the questions posed using data for five East African economies, namely, Ethiopia, Kenya, Rwanda, Tanzania, and Uganda, for the period 2014 through 2022. We use the traditional panel fixed effects regression, which can control for country-specific characteristics and time-related events with the ability to affect the underlying relationships, in the first instance. For robustness checks, we also use the instrument variable fixed effects estimation.

We report interesting findings. First, we document a negative and largely significant relationship between the banking sector profitability and the real sector performance in the region. However, we do not document a discernible relationship between agricultural sector productivity and bank performance. Prodding deeper, we find that noninterest income of banks act as a more effective channel of transmission of adverse effects from the banking sector to real sectors such as manufacturing, while the interest channel tends to transmit positive effects especially to the services sector. The services sector results, however, need to be interpreted with caution given "Services" are defined to include financial services. Our results are robust to alternative estimation methods and do not appear to be driven by the endogeneity bias.

5.2 Policy implications

We make several policy recommendations. First, the negative- to no-relationship between bank performance and real sector productivity speaks to possible predatory behavior of banks. To address this, countries in the East African region may want to consider the creation of state-owned banks or specialized finance agencies with a mandate to provide banking services (especially credit) to vulnerable but important sectors with high social returns such as agriculture and small, micro, and medium enterprises. One may criticize this proposal on the grounds that state-owned banks are often less efficient than private banks in developing countries (e.g., Noulas, 2001), and due to concerns that state banks may not operate profitably (García-Herrero et. al, 2009). However, some studies do not record evidence of a systematic difference in the efficiency of private and public banks (e.g., Karas et al., 2010) while others find that the lower performance of state-owned banks and associated fiscal costs are outweighed by the benefits of state-owned banks' financing of sectors with higher social returns and lower private sector investments (Levy-Yayeti et al., 2004). A modified version of this policy proposal is the option for the public sector to work alongside private banks to offer subsidized credit to firms in sectors with high social returns. Under this arrangement, the state buys out a specified proportion of the market interest rate (say 4%), allowing the bank to offer credit to firms in specified sectors at below-market interest rates.

Second, we find that noninterest income is the most important channel through which banks' performance affect real sector productivity. Noninterest charges of banks may be motivated by the need to diversify income especially when faced with a policy regime that limits risk-taking to mitigate systemic risk. However, existing research shows that noninterest income increases bank fragility and does not provide diversification benefits (e.g., Stiroh, 2004) since, for the typical bank, noninterest income is positively correlated with interest income. These effects are nuanced and depend, in some cases, on the degree of bank concentration in the economy: for example, Engle et al (2014) show that noninterest income does not reduce the volatility of profitability in low concentration economies but can reduce systemic risk in high concentration economies.

Thus, although real sector productivity appears to be adversely affected via the noninterest income channel, the policy options must be nuanced: countries in the East African region, such as Kenya, with relatively low bank concentration may propose policies to limit the use of noninterest income to reduce the systemic risk and to boost real sector productivity. If some level of restriction is already imposed in such countries, regulatory agencies may have to tighten their enforcement. However, for countries such as Uganda, with relatively high levels of bank concentration, although noninterest income inhibits real sector productivity, there are benefits in terms of low volatility in bank profitability; such countries do not have to impose restrictions on banks' noninterest charges.

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APPENDIX

Table A1: Definition and construction of variables

Variable	Construction/Definition of variable	Data source
Manufacturing value added, per capita	Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources.	World Development Indicators
Services value added, per capita		
Agriculture[1] value added, per capita		
Banks' return on average equity		Bank Focus
Banks' returns on average assets		
Banks' return on equity, using PBT		
Banks' interest income on loans	Interest earned on loans and advances	
Banks' noninterest income	Income from noninterest sources such as fees and commissions	
Banks' cost-to-income (efficiency) ratio		
Gross domestic product per capita	The average of countries' economic output normalized by total population	
Credit to the private sector, by banks	The financial resources provided to the private sector by deposit taking corporations except central banks, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment	World Development Indicators
Human development index	This is a synthetic index composed of Health, Education, Social Protection and Welfare and Sustainable Environment. Values range from 0 (worst) to 100 (best).	Mo Ibrahim Foundation
Regulatory quality	Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Values range from -2.5 (worst) to +2.5 (best).	World Development Indicators
Inflation (from consumer price index)	Percentage change in consumer price index	
Trade openness		

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