Human Capital Investment and the Quality of Financial Services

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Abstract

Utilizing a near-universe dataset on job postings, I examine whether and how human capital investment affects the quality of financial services in commercial banks. I measure a bank's investment in three major functions behind commercial banking services: relationship bankers, loan officers, and technology professionals. I find that higher investment in local relationship bankers is associated with higher quality of financial services (i.e., fewer customer complaints), while investment in other job categories does not show any significant effects. In a cross-sectional analysis, I find that this effect is more pronounced in counties with lower financial literacy. When it comes to a bank's response on resolving customer complaints, relationship bankers are more likely to close complaints with explanation or non-monetary relief. Further, I find that the impact of relationship bankers is limited to the county where the human capital investment takes place. Overall, I find robust evidence that local relationship bankers are more likely to improve the financial service quality, suggesting that they can be an integral part of bank consumer satisfaction.

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1. Introduction

It is important to understand the determinants of financial service quality as it is critical to the financial opportunities of individuals, to the economic development of a region and to the success of the banking business (Campbell, Jackson, Madrian, and Tufano, 2011). While prior literature on financial service quality have extensively studied the impact of factors external to banks, such as local trust (Hayes, Jiang, and Pan, 2021), customers' demographic characteristics (Raval, 2020), and regulations (Begley and Purnanandam 2019; Dou and Roh, 2023), relatively less attention has been given to banks' internal investments that affect how banks provide financial services to consumers. In this study, I examine banks' human capital investment in major functions behind commercial banking service, and aim to provide the first empirical evidence on how banks' human capital investment affects the quality of financial services.

To provide a comprehensive view of bank's human resources investment, I capture hirings behind three major functions: relationship bankers, loan officers, and technology professionals. These job categories account for majority of the entire job posting in commercial banks and each plays a distinguished role in determining a banking customer's experience[1]. Relationship bankers build and manage personal relationships with clients[2]; loan officers evaluate loan applications and making decisions on whether to approve or deny them; technology professionals, such as computer programmers and software engineers, develop and test systems for online banking platforms.

It is ex ante unclear whether and which functions of human capital investment improve financial service quality. First, investment in relationship bankers could lead to better financial service quality as they serve as a liaison between banks and consumers. As such, they may help

[1] For other job categories, each account for less than one percent of the entire job postings in commercial banks during the sample period. Panel A of Table 2 presents descriptive statistics of job postings for the sample banks.
[2] Banks also refer to relationship bankers as personal bankers, universal bankers, sales representatives, business development, or bankers. Job titles may vary across banks and financial institutions.

banks to accumulate local network and knowledge, and consequently result in faster response times, adequate issue resolution, and extended customer support. Second, investment in loan officers could improve the quality of financial service because skilled loan officers thoroughly analyze borrowers' financial situations and make informed lending decisions. Better lending decisions could lead to a higher likelihood of loan repayments and higher consumer satisfaction. Third, investment in technology professionals could improve financial service quality as they help update banks' technological infrastructure, leading to more efficient system performance and better functionality offered to customers.

I utilize a near-universe dataset on job postings to obtain timely information on hiring activities for U.S. banks[3]. The dataset provides accurate observations on job functions, job location, and the time of hiring. Following prior studies (Wang, 2022; Dou and Roh, 2023), I proxy the quality of financial services by the number of customer complaints related to mortgage from the Consumer Financial Protection Bureau (CFPB) Consumer Complaint database scaled by the number of mortgage loan origination from the Home Mortgage Disclosure Act (HMDA) database. To ensure the hiring is for commercial banking, rather than investment banking service, I delete banks with investment banking service fees greater than one percent of net interest income. My final sample consists of 109 banks with information of job postings, customer complaints, and mortgage loans from 2013 to 2021.

I examine a bank's accumulative hiring by each function over a three-year window and its association with financial service quality in the fourth year. I find that banks with higher

[3] As this study aims to understand the effects of hiring on financial service quality in the setting of commercial banking services, I delete banks operating in investment banking services. In particular, I drop banks with investment banking service fees scaled by net interest income greater than one percent. Furthermore, I also visit banks' official websites to ensure whether their major business is personal banking, rather than investment banking, by confirming their business operations and descriptions.

investment in local relationship bankers are associated with fewer customer complaints, while investment in other job categories do not show any significant effects with the quality of financial services. Moreover, I find that only investment in *local* relationship banking associates with higher financial service quality, and that investment in relationship banking (or in any other human resources) in non-local areas does not impact financial service quality. The above findings are robust to controlling for lagged bank-level variables (i.e., size, ROA, percentage of equity, and percentage of deposits), and county-level variables (i.e., population, median income, percentage of minority population, median age, and unemployment rate). The results are also robust to various fixed-effect specifications including (i) bank-fixed effects, (ii) year-fixed effects, (iii) (state × year)-fixed effects, (iv) bank and year-fixed effects, (v) bank and (state × year)-fixed effects, and (vi) bank, county, and year-fixed effects.

I also examine whether each function of human capital investment has differential impacts by consumer complaint issue types. First, I identify the reasons why bank consumers complain and find the major issues are (1) loan collection (i.e., loan modification, collection, foreclosure; struggling to pay mortgage), (2) loan service (i.e., loan servicing, payments, escrow account; trouble during payment process), (3) loan application (i.e., application, originator, mortgage broker; applying for a mortgage or refinancing an existing mortgage), and (4) others (i.e., other types of complaint issues). Second, I examine whether and how human capital investment have any differential impacts by complaint reasons. I find that investment in relationship bankers is associated with declines in most major types of complaints, suggesting that they play a key role in improving the financial service quality in general.

Next, I further investigate how banks respond to consumer complaints. More specifically, I examine whether human capital investment in banks affects the response types when a complaint

occurs. When bank consumers complain against a bank, the sample banks usually (1) close with explanation, (2) close with non-monetary relief, or (3) close with monetary relief[4]. I reperform the empirical specification to examine the effects of bank hiring on how a bank resolves a complaint. I find that hiring more relationship bankers is associated with declines in complaints that are both closed with explanation and with non-monetary relief, while it does not significantly affect complaints closed with monetary relief. Overall, relationship bankers are more likely to improve financial service quality with communication and non-financial resolution.

I further investigate a cross-sectional analysis to examine whether the effect is pronounced in counties with lower financial literacy. Given that relationship bankers are more likely to close consumer complaints with explanation or non-monetary relief, I predict that the effects of local relationship bankers are more pronounced in counties with lower financial literacy because relationship bankers will likely provide additional personalized explanations on financial products and services. I find that the effect of relationship bankers is more pronounced in counties with lower financial literacy, suggesting that their man duty as a liaison between customers and banks is more valuable to consumers with a lack of knowledge in financial practices.

Moreover, I also conduct a series of robustness tests to address concerns related to the inferences from the main analysis. First, one possible concern is that the results may not be consistent for the periods before Covid-19. During the pandemic, consumers may have adjusted their expectations due to pandemic-related challenges, resulting in a lower number of complaints about financial service quality. Furthermore, limited access to bank branches during lockdowns

[4] Most banks have the following three major response options for consumer complaints as follows. First, complaint "closed with explanation." For example, when a consumer who submitted a complaint against a bank because the consumer was denied a credit line increase might receive a written explanation on why the request was not approved. Second, complaint "closed with non-monetary relief." Examples of non-monetary relief include "correcting credit report errors, changing the term of an account or easing debt collection calls." Third, complaint "closed with monetary relief." It means that the bank provided a "measurable" dollar amount to the consumer. Examples of monetary relief include refunds for a penalty fee (Consumer Action Report: CFPB Consumer Complaint Database, 2016).

might have led to decreased availability of products and services and thus reduced the opportunity for interactions and complaints. Meanwhile, the Covid-19 pandemic also had a notable impact on banks' human capital investment due to hiring freezes and reductions in response to economic uncertainties. Also, most banks shifted their hiring processes to remote working arrangements from different geographic locations. Hence, the results of the main analysis may not be robust if I include this pandemic period in the sample. To mitigate this concern, I reconduct the main analysis by focusing on periods before Covid-19 and confirm that the findings are robust. Second, another possible concern is that the results may be derived by how I measure human capital investment using two-digits SOC codes. To assess this possibility, I reconduct the main analysis by using more detailed job categories based on three-digits SOC codes for human capital investment and confirm that the effects of relationship bankers are robust. Overall, I find robust evidence that investment in relationship bankers is more likely to improve the financial service quality.

I further investigate whether tellers, another major category of human capital in banks, would improve the financial service quality. Since tellers take approximately 44 percent of total job postings in the sample, they may play a critical role in determining consumer satisfaction. However, due to their limited roles and professional expertise, I predict that tellers would not necessarily improve the quality of financial services. Thus, I perform a falsification test with tellers with various sets of fixed effects. I find that hiring more tellers is not significantly associated with the financial service quality.

Overall, this study makes two contributions. First, this paper contributes to the growing understanding of the financial service quality. Hayes, Jiang, and Pan (2021) suggest that local trust level is an important determinant of financial service quality by showing that higher local trust culture is negatively associated with bank customer complaints. Raval (2020) investigates

demographic characteristics associated with consumer complaining behavior and finds that areas with a higher minority population percentage are less likely to complain. Also, Begley and Purnanandam (2021) show that existing bank regulation policies, which enforce banks to focus on quantities of loans, are likely to harm the quality of financial services particularly in minority neighborhoods. While these studies have extensively focused on determinants external to banks to understand customer complaints, less is known about banks' internal factors that impact the quality of financial services. Thus, this study provides the first empirical evidence that human capital investment in local relationship bankers is a key determinant of financial service quality.

Furthermore, this study extends research on human resources in the financial industry. Prior studies have mostly focused on the allocation and function of loan officers. Most relatedly, Huang, Linck, Mayer, and Parsons (2022) study the geographic allocation of talented loan officers and find that banks tend to assign high-skilled loan officers in richer areas while they allocate low-skilled loan officers in poorer areas, suggesting that internal labor allocation decisions of banks contribute to disparities in financial service quality. In addition, Jiang, Lee, and Liu (2022) find that minority loan officers are more likely to approve minority mortgage applications. This study extends this line of research by investigating the investment in all major functions of human resources in commercial banking and assesses their differential impact on the quality of financial service.

The remainder of this paper is organized as follows. In Section 2, I review relevant literature and develop my research hypotheses. Section 3 contains a description of the dataset and sample construction. Section 4 presents an empirical design and Section 5 documents the results and Section 6 shows additional analyses. Section 7 concludes.

2. Literature Review

2.1. Human Capital Investment and Allocation in Banks

Prior studies in this stream of research have explored (1) the allocation of talent in banks and (2) regulation-induced investment in human capital. First, regarding how banks allocate their human workforce, Egan, Matvos, and Seru (2019) investigate the allocation of financial advisors *across* different financial advisory firms and find that only specific firms tend to hire financial advisors who previously committed financial misconduct. Thus, there exist heterogeneities in financial misconduct across different advisory firms. On the other hand, Huang, Linck, Mayer, and Parsons (2022) study the allocation of loan officers *within* banks and document that banks allocate their most talented loan officers to higher income neighborhoods. Consequently, it leads to disparities in the quality of financial services across different income strata.

Second, with the advent of granular job posting datasets (e.g., LinkUp and Burning Glass Technologies), researchers also have started to study how regulations trigger investment in certain types of talents in banks. For example, Schneider, Strahan, and Yang (2023) examine the changes in banks' investment in human capital after the Global Financial Crisis and find that banks increase their labor demand for risk management practices mainly due to regulatory changes in stress testing. Furthermore, Kim, Kim, Kleymenova, and Li (2022) study the effects of adoption of the Current Expected Credit Losses (CECL) on banks' information production and find that banks indeed invest more human capital in the CECL-related information systems.

While these studies provide insights on banks' internal decisions for human capital investment, they only focus on specific functionalities in banks. Given that banks operate with multiple functions together, this paper aims to provide a comprehensive examination of banks' human capital investment into all major functions behind commercial banking services.

2.2. Financial Service Quality of Banks

Studies in finance and marketing has long been investigated the causes and consequences of service quality through customer reviews and customer grievances[5]. For example, Huang (2018) examines whether consumer opinions convey value-relevant information to financial markets and finds that customer product reviews on Amazon contains valuable information for stock pricing.

Due to the lack of consumer-driven database, however, it has traditionally been difficult to assess and track the quality of financial services, as the release of complaints database, especially with the complainants' location information, possibly contains banks' proprietary information and competitive advantages[6][7]. In 2013, the U.S. Consumer Financial Protection Bureau (CFPB) started to disclose banks' complaint database to the public with the intention to treat bank consumers fairly and transparently, and protect consumers from financial misconduct. Also, the CFPB delivers consumer complaints to banks so that financial institutions can review this dataset to identify areas to improve and monitor their practices accordingly.

The unique features of the CFPB Consumer Complaints database enable researchers to investigate financial service quality of banks. First, it provides in-depth information about complaints, including the name of banks that received complaints, submission dates, complainers' zip codes, detailed consumer experiences and their narratives, and types of products and issues. Second, the database is publicly available in a timely manner. Since the goal of the CFPB with

[5] See Richins, 1983; Fothefrnell and Wernerfelt, 1987; Conlon and Murray, 1996; Bowman and Narayandas, 2001; Homburg and Furst, 2005; Chevalier and Mayzlin, 2006; Chang et al., 2016; Fornell et al., 2016; Huang, 2018; Knox and van Oest, 2014; Lee et al., 2015; Liu et al. 2019; Luo, 2007, 2009; Ma et al., 2015.

[6] The American Financial Services Association (2012) states in its comment letter that "The release of this database (i.e., the CFPB Consumer Complaints database) improperly publishes trade secrets and erodes banks' competitive advantages… the data should be aggregated… It would be ideal if the CFPB would simply not release information by company name. However, if the CFPB is going to do so, the CFPB should at least eliminate the zip code from the fields it releases."

[7] The Consumer Mortgage Coalition (2015) states that "The release (of the CFPB Consumer Complaints database) enables competitors to find out quite readily information such as where, geographically, the firm's customers are, the patterns of complaint subjects in complaints about the firm, broken down by product and sub-product."

regard to the complaints database is to provide the complaints data in order to help bank consumers with "timely and understandable information to make responsible decisions about financial transactions" (CFPB, 2013), the CFPB publishes complaints promptly and transparently. For example, the CFPB publishes a complaint right after the bank responds, confirming that consumers have commercial relationship with the bank, or after 15 days. Additionally, linkage with the Home Mortgage Disclosure Act (HMDA) dataset enables to capture the quality of financial services with the ratio of complaints scaled by total mortgage loan origination from a bank branch.

Several concurrent papers address distinct research questions using the CFPB Consumer Complaints database. Hayes, Jiang, and Pan (2021) find that local trust is associated with the number of complaints and the establishment of the CFPB reduces bank fees in low-trust areas. Dou and Roh (2023) find that banks with more complaints tend to receive less mortgage applications following the CFPB disclosure on bank complaints. Furthermore, Raval (2020) investigates demographic characteristics associated with higher complaint rates and finds that high-minority areas are less likely to complain. Begley and Purnanandam (2019) study the effects of the quantity-focused regulations (i.e., the Community Reinvestment Act) and find that the quality of financial services decline following the regulations enforcing banks to lend more. This effect is more pronounced in neighborhoods with higher share of minority population, lower income, and lower educational attainment. While prior literature extensively focus on *external* environments of banks (e.g., local trust, demographic characteristics, and regulations), little is known about banks' *internal* investments associated with how banks provide financial services to consumers. This paper extends the research by providing new evidence on how banks' *internal* decisions on human capital investment affect financial service quality.

2.3. Hypothesis Development

It is *a priori* unclear whether and which *types* of banks' human capital investment has been the primary source of financial service quality. First, investment in relationship bankers could potentially improve the quality of financial services. As relationship bankers often serve as the primary point of contact for addressing customer inquiries, concerns, and complaints, investment in relationship bankers may result in faster response times, adequate issue resolution, and increased customer support (e.g., Herpfer, 2021, Frattaroli and Herpfer, 2022).

Second, investment in loan officers could enhance financial service quality. Loan officers possess specialized knowledge in assessing creditworthiness, evaluating loan applications, and conducting in-depth financial analysis (e.g., Behr, Drexler, Gropp, and Guettler, 2020; Berg, Puri, and Rocholl, 2013; Cole, Kanz, and Klapper, 2015; Drexler and Schoar, 2014; Hertzberg, Liberti, and Paravisini, 2010). For example, Bushman, Gao, Martin, and Pacelli (2021) find that individual loan officers play a significant role in designing syndicate loan contracts and thus influencing loan performance. Thus, investment in loan officers can result in skilled professionals with the ability to thoroughly analyze borrowers' financial situations and make informed lending decisions. Better lending decisions could lead to a higher likelihood of borrowers' loan repayments and thus higher consumer satisfaction. Also, loan officers establish relationships with borrowers, provide guidance, and address any concerns during the loan lifecycle.

Lastly, investment in technology professionals could advance the service quality of banks. Technology professionals refer to software developers, data scientists, cybersecurity experts, and IT specialists. As investment in technology professionals result in relevant infrastructure, it leads to faster system performance, adequate problem resolution, and advancement in the functionality and features offered to customers (e.g., Buchak, Matvos, Piskorski, and Seru, 2018, Fuster, Plosser,

Schnabl, and Vickery, 2019; Boot, Hoffmann, Laeven, and Ratnovski, 2021). With the advent of digital lending platforms and changing customer behavior, banks have increasingly shifted their lending dynamics to digital lending. Since these platforms leverage automation and data analytics to assess creditworthiness, perform risk analysis, and make lending decisions, banks could ALSO process loan applications more efficiently and reduce the need for loan officers within traditional banks. Also, customers' preferences and behaviors have shifted towards digital channels for loan applications as they expect quicker and more convenient loan processes that could be accessed online or through mobile apps.

Overall, although investment in any of the three functions is likely to lead to higher financial service quality, it is unclear whether investment in which function is the primary resource of bank customer satisfaction. This study aims to provide answers to this question.

3. Data and Sample

3.1. Banks' Hiring Activities

I leverage several novel datasets to conduct empirical analysis. First, I build a nationwide panel of banks' human capital investment based on job postings information from LinkUp from 2010 to 2021. LinkUp is a job search engine that indexes job openings from company websites. By using proprietary web-crawling technology, LinkUp scrapes near-the-universe job postings online and organizes them into a searchable database. Unlike other job search engines that aggregate job listings from various sources, LinkUp includes job postings directly from company career websites. Therefore, it ensures accuracy for researchers to analyze hiring trends, skill requirements, and other labor market indicators. The LinkUp database provides a variety of information about job postings. More specifically, the data contains information on job titles, company names, job locations, job descriptions, application instructions, job posting dates, job

posting deletion dates, job status whether the job posting is active or expired, and the Standard Occupational Classification (SOC) Occupational Information Network (O*NET) codes. Importantly, the SOC O*NET code is a standardized way to classify different types of jobs and is used by government agencies, researchers, and other organizations to collect and analyze data about the labor market. More specifically, LinkUp provides a six-digit number for the SOC O*NET code that is based on skills, knowledge, and abilities of an occupation. The first two digits represent the major group, the third digit represents the minor group, and the remaining three digits represent the detailed occupation. For this study, I use the first two digits of the SOC O*NET codes and measure a bank's human capital investment in four major functions behind financial services: (1) relationship bankers (SOC O*NET code 41), (2) loan officers (SOC O*NET code 13), (3) tellers (SOC O*NET code 43), and (4) technology professionals (SOC O*NET code 15). Appendix 2 describes anecdotal evidence providing detailed job descriptions for each function.

3.2 Financial Service Quality

Following prior literature, I use banks' consumer complaints as the proxy for financial service quality (Wang, 2022; Dou and Roh, 2023). I connect the panel of bank human resources to bank customer complaints regarding mortgage loans from the Consumer Financial Protection Bureau (CFPB) from 2013 to 2021. The CFPB Consumer Complaints Database includes a wide range of information related to consumer complaints about financial products and services. The database includes (1) the complainer information such as location including state and zip code, and whether the consumer disputed with the bank, (2) complaint information such as the date received, the type of product (e.g., mortgage), sub-product (e.g., conventional home mortgage, FHA mortgage), issue (e.g., trouble during payment process), consumer complaint narrative, and how the complainer submitted the complaint (e.g., via web), and (3) lender information such as

the bank name that received the complaint, how the bank handled the complaint (e.g., closed with monetary relief, in progress), and whether the bank provided timely response.

The CFPB customer complaints database began in July 2011 with the coverage of credit card complaints first and mortgage-related complaints later in December 2011. It has since been expanded to cover other products such as payday loans, checking accounts, and student loans. The database was first made available to the public in June 2012. Since then, the CFPB has regularly updated and expanded the dataset, adding new features and functionality to make it more accessible and user-friendly that it includes millions of consumer complaints to date. In this study, I focus on the years from 2013 to 2021 to avoid the effects of the CFPB disclosure regulation occurred in June 2012. Also, the consumer complaints database covers the sample banks since 2013.

In particular, I focus on mortgage-related complaints for the following reasons. First, a home mortgage is one of the most significant financial products in the US economy, involving trillions of dollars in outstanding loans and many millions of consumers across the country. The mortgage is often the single most significant and complex transaction that many households ever engage with. Second, mortgage-related misconduct in the financial market has captured the center of many policy decisions and academic papers in recent years. Third, I aim to evaluate the number of complaints regarding a product category while controlling for the number of transactions (or interactions) between banks and consumers in that category in the given area. While I can find an appropriate variable for mortgages, it is difficult to find such a variable for other transactions such as credit card complaints. In this study, I use the number of mortgage loan originations from the Home Mortgage Disclosure Act dataset. Specifically, I match the loan applications to bank identifiers from the Report Panel in the HMDA database and aggregate the loan application data

at the bank-county-year level. I use both total number and amount of mortgage loan originations as denominators to measure the quality of financial services and human capital investment, respectively. Finally, it is economically less meaningful to compare quality across different products.

I supplement the main dataset with information from three additional sources. First, in order to control bank-level characteristics, I use the Call Reports data to control bank-level characteristics such as size, return on assets (ROA), percentage of equity, and percentage of deposits. Second, I use the FDIC Summary of Deposits (SOD) dataset to acquire the number of branches in order to consider bank competition. Third, I use the Census datasets to control for county-level characteristics such as total population, median income, percentage of bachelor's degree, percentage of minority population, median age, and unemployment rate.

3.3 Sample and Summary Statistics

Table 1 shows the sample construction. As this study aims to understand the effects of hiring on financial service quality in the setting of commercial banks, I delete banks operating in investment banking services by dropping banks with investment banking service fees scaled by net interest income greater than one percent. Furthermore, I confirm a bank’s business operations and descriptions by visiting the bank's official websites to ensure whether their major business is personal banking, rather than investment banking. I only retain observations for years after 2013 as the CFPB customer complaints include the sample banks since 2013. Also, I drop observations with missing information for both bank- and county-level variables. The total sample of bank-county-year observation ends up with 155,887 which is composed of 109 unique banks in the sample between 2013 and 2021.

Panel A of Table 2 presents descriptive statistics of banks' job postings by the two-digit SOC codes in descending order. First, the sample banks hire the office and administrative support occupations (i.e., tellers; code 43) the most with 43.76 percent during the sample period. Second, business and financial operations occupations (i.e., loan officers; code 13) present 19.17 percent. Third, sales and related occupations (i.e., relationship bankers; code 41) documents 14.04 percent. Fourth, computer and mathematical occupations (i.e., technology professionals; code 15) shows 6.35 percent. In this study, I consider these four major categories (i.e., relationship bankers, loan officers, technology professionals, and tellers) that account approximately 85 percent of the entire job postings in commercial banks. Although management occupations (code 11) accounts approximately 14 percent, this category does not have distinctive responsibilities with specific banking functions and therefore I exclude this group from the analysis[8].

Panel B of Table 2 shows the summary statistics of the sample and documents bank-level characteristics, banks' hiring activities for major functions, and county-level characteristics. Overall, the sample banks are likely to hire more tellers than other major categories.

Figure 1 shows the geographic map of the CFPB customer complaints for mortgage loans for the sample banks. The darker the color, the more complaints the sample banks received from their customers. Consistent with a prior study (Hayes, Jiang, and Pan, 2021), urban areas are likely to receive more complaints from their customers. To understand banks' hiring practices in four major functions, I investigate the allocation of human capital by using geographic maps. Figure 2 shows the geographic maps of human capital investment for relationship bankers (Panel A), loan officers (Panel B), technology professionals (Panel C), and tellers (Panel D), respectively. The darker color represents more investment in human capital. The graph confirms that human capital

[8] The results are still consistent including this group of functions. Both the coefficients and statistical significance are robust when I include management occupations in the analyses.

that works at the branch-level (e.g., relationship bankers, loan officers, and tellers) are geographically widely distributed, whereas human capital that works at the bank-level (e.g., technology professionals) are often clustered in urban areas where their headquarters or technology centers are located. I utilize the geographical distribution for different types of human resources in the empirical model.

4. Empirical Specification

I examine whether and how banks' hiring over the past three years affect the quality of financial services at the current year with the following empirical design.

$$Y_{i,c,t} = \alpha_i + \gamma_c + \delta_t + \beta_1 Relationship\_Bankers_{i,c,[t-3,t-1]} + \beta_2 Loan\_Officers_{i,c,[t-3,t-1]} + \beta_3 Tech\_Professionals_{i,[t-3,t-1]} + X_{i,c,t-1} + \varepsilon_{i,c,t}$$

where i indexes bank, c indexes county, and t indexes year. Y is the dependent variable of interest that is the quality of financial services. Following prior studies, I use the number of mortgage complaints against bank i in county c and year t divided by the number of mortgage loans of the bank in the county in that year (Wang, 2022; Dou and Roh, 2023). α_i is the bank-fixed effects, γ_c is the county-fixed effects, and δ_t is the year-fixed effects. For robustness, I also test with a battery of fixed effects specifications including (i) bank-fixed effects, (ii) year-fixed effects, (iii) (state × year)-fixed effects, (iv) bank and year-fixed effects, (v) bank and (state × year)-fixed effects, and (vi) bank, county, and year-fixed effects.

The independent variables are banks' human capital investment over the past three years. More specifically, I focus on three major functions behind financial services that are loan officers, relationship bankers, and technology professionals. It is noteworthy that banks hire technology professionals at the bank-level, rather than county-level, for centralized management to ensure

consistency, efficiency, and standardization across various branches. Consequently, banks achieve economies of scale by reducing duplication of efforts and optimizing costs with centralization of technology functions at the bank-level. Thus, this study investigates technology professionals at the bank-level, and other major functions (i.e., relationship bankers and loan officers) at the county-level. To measure human capital investment of banks, I aggregate the total number of job postings for the three major functions using the two-digit SOC codes and divide it by the total amount of mortgage loans of a bank in a county. Since the chance of any random job posting divided by the amount of mortgage loans is low, I multiply this measure by 100, which can be read as a bank's new employment per dollar of loans.

For control variables, X is a vector of lagged control variables at both bank- and county-levels, which hare bank size, percentage of equity, ROA, percentage of deposits, natural log of total population, natural log median family income, natural log of median age, percentage of bachelor's degree, percentage of male population, and unemployment rate. The standard error is clustered by banks.

5. Results

5.1. Main Result

Table 3 presents results that examine the effects of human capital investment of banks on the quality of financial services. The results in column 1 show a statistically strong negative relationship between investment in relationship bankers and the likelihood that banks receive mortgage complaints from their customers with bank-fixed effects. More specifically, the coefficient on relationship bankers is negative and statistically significant (-0.04186, t-stat = -2.75), suggesting that banks, with more hiring of relationship bankers for the past three years, are likely to have fewer customer complaints. However, investment in loan officers and technology

professionals do not show any statistically significant relationship with customer complaints. Columns 2 through 6 corroborate this finding. Column 2 shows the consistent result with year-fixed effects. The coefficient on relationship bankers is negative and statistically significant (-0.03985, t-stat = -2.23). Column 3 confirms this finding with (state × year)-fixed effects. The coefficient on relationship bankers is negative and statistically significant (-0.04615, t-stat = -2.41). Column 4 shows the consistent result with bank and year-fixed effects. The coefficient on relationship bankers is negative and statistically significant (-0.04146, t-stat = -2.77). Column 5 corroborates this finding with bank and (state × year)-fixed effects. The coefficient on relationship bankers is negative and statistically significant (-0.04825, t-stat = -3.15). Column 6 shows the consistent finding with bank, county, and year-fixed effects. The coefficient on relationship bankers is negative and statistically significant (-0.05099, t-stat = -3.31). Overall, the results show that a bank's insufficient investment in relationship bankers are likely to cause customer complaints, whereas investment on other categories of human capital investment in banking do not significantly impact the quality of financial services.

5.2. The Effects of Human Capital Investment in Other Counties

In Table 4, I further investigate whether banks' human capital investment in other counties also impacts the quality of financial services in a county. On the one hand, it is possible that investment in banking professionals in other areas could have an impact on nearby regions due to economic interdependence and knowledge spillover. When individuals with high skills and knowledge work together between regions, expertise and ideas can spill over into neighboring counties. On the other hand, it is also possible that the effects of human capital investment can be indeed constrained within specific regions if professionals have specific boundaries that they are responsible for management. For example, relationship bankers and loan officers are often

assigned specific territories, such as locations, industries, or types of clients, or geographic regions. Also, they often focus on managing relationships with clients within their designated areas to ensure that clients receive personalized attention and support from a dedicated professional. Thus, it is unclear whether the effects of human capital investment of banks are limited to a certain geographic area or have broader impacts beyond local boundaries.

To empirically examine the boundaries of the effects of relationship bankers, I proxy other counties' human capital investment by aggregating the entire job postings in other counties (i.e., subtracting the current county's job postings from the entire job postings) for the three major functions in banks. Table 4 presents the results from replicating the empirical model with fixed effects. Overall, the coefficients on relationship bankers as well as other human capital investment do not show any significant effects, suggesting that the effects of relationship bankers on financial service quality are confined to local areas where they work.

5.3. Types of Consumer Complaints

In Table 5, I examine the effects of human capital investment on various types of bank consumer complaints. To understand the reasons why consumers complain against banks, I firstly investigate consumer complaints by complaint reasons. The major issues that consumers complain against the sample banks are as follows: (1) loan collection (i.e., loan modification, collection, foreclosure; struggling to pay mortgage), (2) loan service (i.e., loan servicing, payments, escrow account; trouble during payment process), (3) loan application (i.e., application originator, mortgage broker; applying for a mortgage or refinancing an existing mortgage), (4) others. In this study, I focus on these four major complaint issues. Appendix B describes consumer narratives for each category of complaints.

Next, I investigate whether hiring specific categories of jobs in banks could lead to differential effects by consumer complaint issues. Table 5 presents the results that I reconduct the empirical specification[9]. It shows that the coefficient on relationship bankers is negative and statistically significant across three major complaint issue types. First, in column 1, the coefficient on relationship bankers is negative but not statistically significant. Second, column 2 presents that the coefficient on relationship bankers on loan service complaints is negative and statistically significant (-0.02117, t-stat = -3.17) suggesting that more human capital investment of relationship bankers in the past three years are likely to decrease consumer complaints related to loan service. Third, column 3 presents the coefficient on relationship bankers is negative and statistically significant (-0.00470, t-stat = -2.23) suggesting that more human capital investment of relationship bankers in the past three years are likely to decrease consumer complaints about loan application. Lastly, in column 4, the coefficient on relationship bankers is negative and statistically significant (-0.00658, t-stat = -2.20) suggesting that more human capital investment of relationship bankers in the past three years are likely to decrease consumer complaints regarding other issues. Overall, human capital investment in relationship bankers is likely to improve the financial service quality across most major issues.

5.4. Bank Responses to Consumer Complaints

I further investigate how banks respond to consumer complaints. In particular, I reperform the empirical specification to examine the effects of human capital investment in the past three years on the percentage of consumes complaints that are (1) "closed with explanation", (2) "closed with non-monetary relief", and (3) "closed with monetary relief"[10]. First, complaint "closed with

[9] In this analysis, I include bank and (State × Year)-fixed effects. This result is also consistent when I include bank, county, year-fixed effects.

[10] In this analysis, I include bank and (State × Year)-fixed effects. This result is also consistent when I include bank, county, year-fixed effects.

explanation." For example, when a consumer who submitted a complaint against a bank because the consumer was denied a credit line increase might receive a written explanation on why the request was not approved. Second, complaint "closed with non-monetary relief." Examples of non-monetary relief include "correcting credit report errors, changing the term of an account or easing debt collection calls." Third, complaint "closed with monetary relief." It means that the bank provided a "measurable" dollar amount to the consumer. Examples of monetary relief include refunds for a penalty fee (Consumer Action Report: CFPB Consumer Complaint Database, 2016). Hayes, Jiang, and Pan (2022) suggest that complaints resolved with any types of reliefs are more meritorious complaints compared to the ones that were closed with explanation.

Table 6 shows the results. In column 1, the coefficient of relationship bankers is negative and statistically significant (-0.03763, t-stat = -2.93), suggesting banks with more hiring of relationship bankers are more likely to reduce complaints closed with explanation. In column 2, the coefficient of relationship bankers is also negative and statistically significant (-0.00986, t-stat = -2.36), showing that human resources investment in relationship banking help reduce complaints closed with non-monetary relief. However, in column 3, the coefficient of relationship bankers is not statistically significant, suggesting that relationship bankers are not likely to resolve complaints with monetary relief that are often more severe complaints. Meanwhile, other job categories of hiring do not show any significant effects. Overall, relationship bankers are more likely to reduce complaints that could be "closed with explanation" or "closed with non-monetary relief."

5.5. Cross-Sectional Analyses

I further investigate a cross-sectional analysis to examine whether the effect is pronounced in counties with lower financial literacy. Given that relationship bankers are more likely to close consumer complaints with explanation or non-monetary relief, I predict that the effects of local relationship bankers are more pronounced in counties with lower financial literacy because

relationship bankers will be more likely to provide additional and personalized explanations on financial products and services. Table 7 shows the results that examine whether the effects of relationship bankers are different depending on financial literacy. In this analysis, I proxy financial literacy by the proportion of population with a bachelor's degree in a county measured in 2013. In column 1, the magnitude of coefficients of relationship bankers is greater and more statistically significant (-0.05416, t-stat = -3.16) than column 2 (-0.04903, t-stat -1.84), suggesting that the effects of relationship bankers is more pronounced in counties with lower financial literacy. On the other hand, the coefficients of loan officers and technology professionals are not statistically significant in both columns 1 and 2. Overall, relationship bankers are more likely to improve financial service quality (i.e., fewer consumer complaints) in areas with lower financial literacy, suggesting that their role as a contact point between customers and banks is more valuable to bank consumers with a lack of knowledge in financial products and services.

6. Additional Analyses

6.1. Robustness of Main Results

I conduct a series of robustness tests to address concerns related to the inferences from the main analysis. First, one possible concern is that the results may not be consistent for the periods before Covid-19. During the pandemic, consumers may have adjusted their expectations due to pandemic-related challenges, resulting in a lower number of complaints about financial service quality. Furthermore, limited access to bank branches during lockdowns might have led to decreased availability of products and services and thus reduced the opportunity for interactions and complaints. Meanwhile, the Covid-19 pandemic also had a notable impact on banks' human capital investment due to hiring freezes and reductions in response to economic uncertainties. Also, most banks shifted their hiring processes to remote working arrangements from different

geographic locations. Hence, the results of the main analysis may not be robust if I include this pandemic period in the sample. To assess this possibility, I replicate the main analysis by focusing on periods before Covid-19. Panel A of Table 8 presents the results with the same set of fixed effects. Overall, the coefficients on relationship bankers are all negative and statistically significant for all sets of fixed effects, confirming the finding that investment of relationship banks are associated with better financial service quality.

Second, another possible concern is that the results may be derived by how I measure human capital investment using two-digits SOC codes. To assess this possibility, I reconduct the main analysis by using more detailed job categories based on three-digits SOC codes for human capital investment. Panel B of Table 8 presents the results with the same set of fixed effects. I confirm that the effects of relationship bankers are robust. Overall, I confirm that investment in relationship bankers is more likely to improve the financial service quality.

6.2. Falsification Test

I further investigate whether tellers improve the financial service quality. As Table 2 describes, tellers take approximately 44 percent of the total hiring of sample banks. However, due to their limited roles and professional expertise in banks, I predict that tellers would not necessarily increase the quality of financial services.

Table 9 presents the falsification test results that examine whether human capital investment in tellers affects the financial service quality. Columns 1 through 6 show that the coefficients on tellers are not statistically significant with various sets of fixed effects, suggesting that more hiring in tellers is not likely to decrease the bank consumer complaints. Overall, I confirm that hiring more tellers do not lead to better consumer financial service quality.

7. Conclusion

Motivated by recent interests on human capital investment in banking, I examine whether and how banks' human capital investment affects the quality of financial services. Using a near-universe dataset on job postings of banks in the US, I obtain timely information on hiring activities for banks and examine a bank's accumulative hiring by each function behind commercial banking services. I find that banks with higher investment in local relationship bankers are associated with fewer customer complaints, while investment in other job categories in banking do not show any significant effects with the quality of financial services. I also find that investment in relationship bankers is associated with declines in most major types of complaints, suggesting that they play a key role in improving the financial service quality in general. In addition, local relationship bankers are more likely to improve financial service quality with communication and non-financial resolution.

My findings have two major contributions to the literature. First, this paper contributes to the understanding of the financial service quality (Hayes, Jiang, and Pan, 2021; Raval, 2020; Begley and Purnanandam, 2021). While prior studies have extensively focused on determinants external to banks to understand customer complaints, less is known about banks' internal factors that impact the quality of financial services. Therefore, I argue that my study provides the first empirical evidence that human capital investment in local relationship bankers is a key determinant of financial service quality. Second, this study also extends research on human resources in the financial industry. Prior studies have mostly focused on the function of loan officers only and studied its separate effects (Huang, Linck, Mayer, and Parsons, 2022; Jiang, Lee, and Liu, 2022). This study contributes to this line of research by investigating the investment in all major functions

of human resources in commercial banking and assessing their differential effects on financial service quality.

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Appendix A: Variable Descriptions

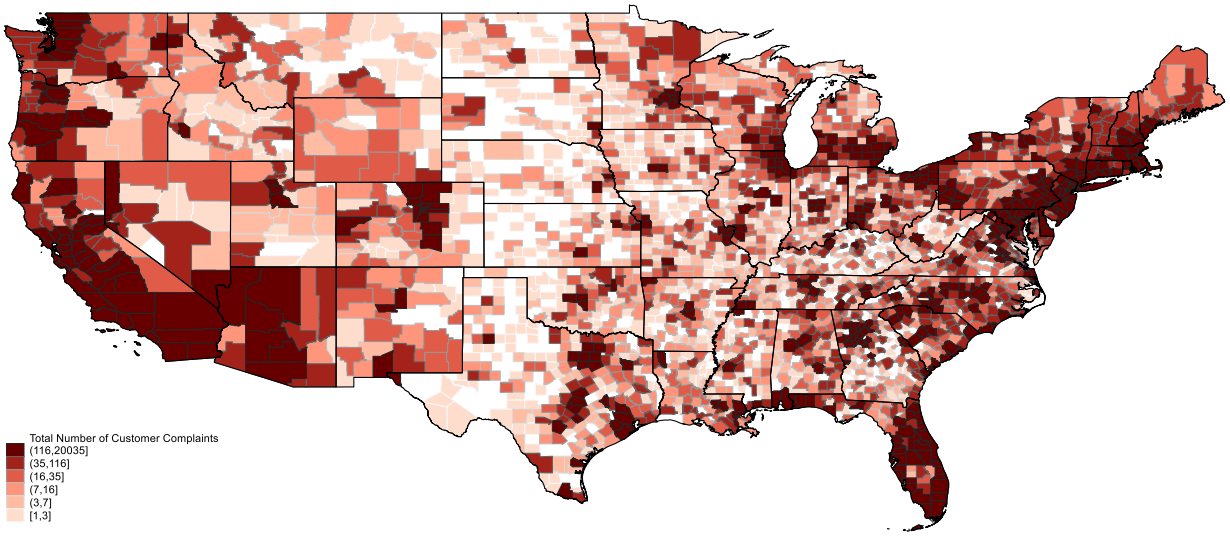
Variables	Description	Data source
Complaints	The percentage of customer complaints which is defined as the number of complaints related to mortgage loans divided by total number of mortgage loan origination.	CFPB & HMDA
Relationship Bankers	The number of job postings for technology professionals, that are occupations in SOC Code 41 (Sales and Related Occupations), divided by total amount of mortgage loan originations multiply by 100.	LinkUp & HMDA
Loan Officers	The number of job postings for loan officers, that are occupations in SOC Code 13 (Business and Financial Operations Occupations), divided by total amount of mortgage loan originations multiply by 100.	LinkUp & HMDA
Technology Professionals	The number of job postings for technology professionals, that are occupations in SOC Code 15 (Computer and Mathematical Occupations), divided by total amount of mortgage loan originations multiply by 100.	LinkUp & HMDA
Tellers	The number of job postings for tellers, that are occupations in SOC Code 43 (Office and Administrative Support Occupations), divided by total amount of mortgage loan originations multiply by 100.	LinkUp & HMDA
Size	The natural logarithm of total assets.	Call Reports
ROA	Returns on assets which is defined as income before extraordinary items scaled by total assets.	Call Reports
Equity	Percentage of equity that is defined as equity scaled by total assets.	Call Reports
Deposits	Percentage of deposits that is defined as deposits scaled by total assets.	Call Reports
Total population	The natural logarithm of total population.	Census
Median income	The natural logarithm of median family income.	Census
Median age	The natural logarithm of median age.	Census

Percentage of minority population	The percentage of non-white population out of total population.	Census
Percentage of Male population	The percentage of male population out of total population	Census
Unemployment rate	The percentage of unemployment rate.	Census
Percentage of bachelor's degree	The percentage of population with bachelor's degree or above out of total population	Census

Appendix B. Excerpt of the Major CFPB Consumer Complaints

Consumer complaint issues	**Consumer complaint narrative**
(1) Loan collection	*"I was laid off due to Covid and, as such, my family got behind on our mortgage. When I got a new job, I contacted my mortgage company to settle the outstanding $XXXX balance in XX/XX/2021. Soon after contacting them, my company sent me to Hawaii for several months to bolster fledgling agencies. AAA sent notarized paperwork to me to complete in Hawaii, but they sent it to the wrong address... twice. The third time they sent the documents they had already expired and I had to request a new set. The 4th time (and over a month later) I received proper documents, had them notarized, and sent back ASAP. I called a week later to see why my specialist hadn't called me with the results of the application to find she no longer worked there. I asked for a manager and was sent to XXXX, who I later found was not a manager at all. XXXX told me AAA made some huge mistakes with my documents regarding a problem."*
(2) Loan service	*"XXXX services changed my address for emergency purposes. When YYY asked my insurance company to provide proof of coverage the documents show the new address not the old address. I have provided YYY proof of the new address from my county at least 6 times via mail, fax and email. When I call in every person every rep tells me they see the documentation but do not know why it is not fixed and they do NOT have the ability to get someone on the phone. They keep just sending emails. Since this has occurred YYY has threatened me 2 times with buying homeowners insurance at MY expense because they can not get it correct. I have attached the documentation to this complaint."*
(3) Loan application	*"I locked in a rate with YYY on XXXX/XXXX/XXXX to refinance my mortgage on my property in XXXX, XXXX. After 4 months of run around, they informed me that I needed to bring $ XXXX cash to closing so I can close on the new loan! Considering we started with minimal cash to close, they changed their mind 4 times and each time the cash to close went higher. It's worthy to note that the consistent increase was not due to any new information I provided after the initial set of information they received, but after a long period of radio silence, when I was not getting responses to my emails or phone calls and messages, they told me that cash to close was increased because they had just noticed my Home Owner 's Association fee."*

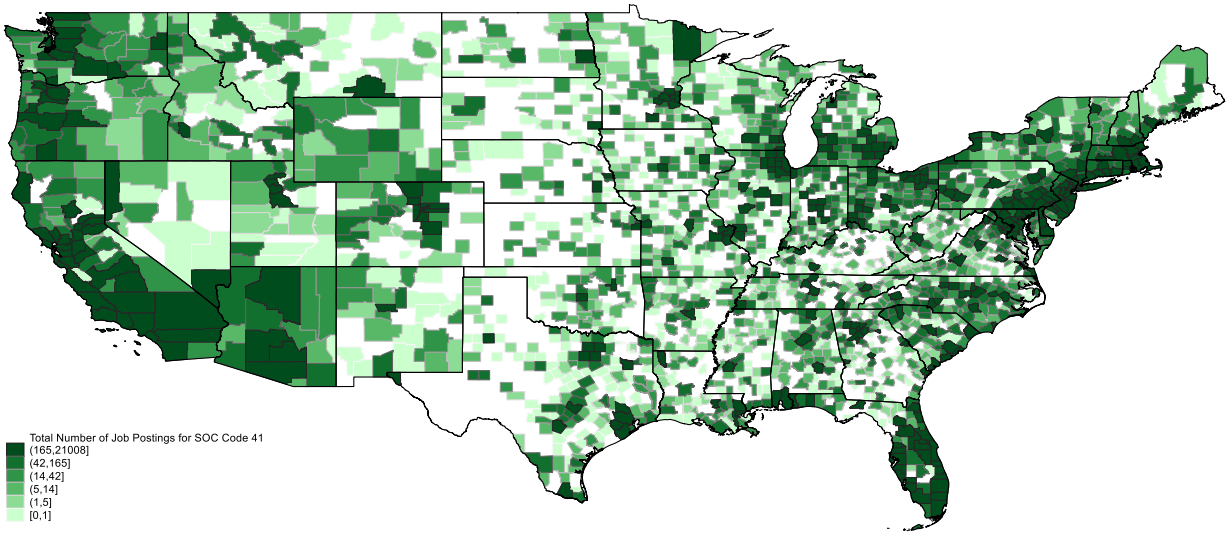
Figure 1: Geographic Map of the CFPB Customer Complaints for Mortgage Loans



This figure shows the geographic map of the CFPB customer complaints for mortgage loans for the sample banks. The darker the color, the more complaints the sample banks received from their customers.

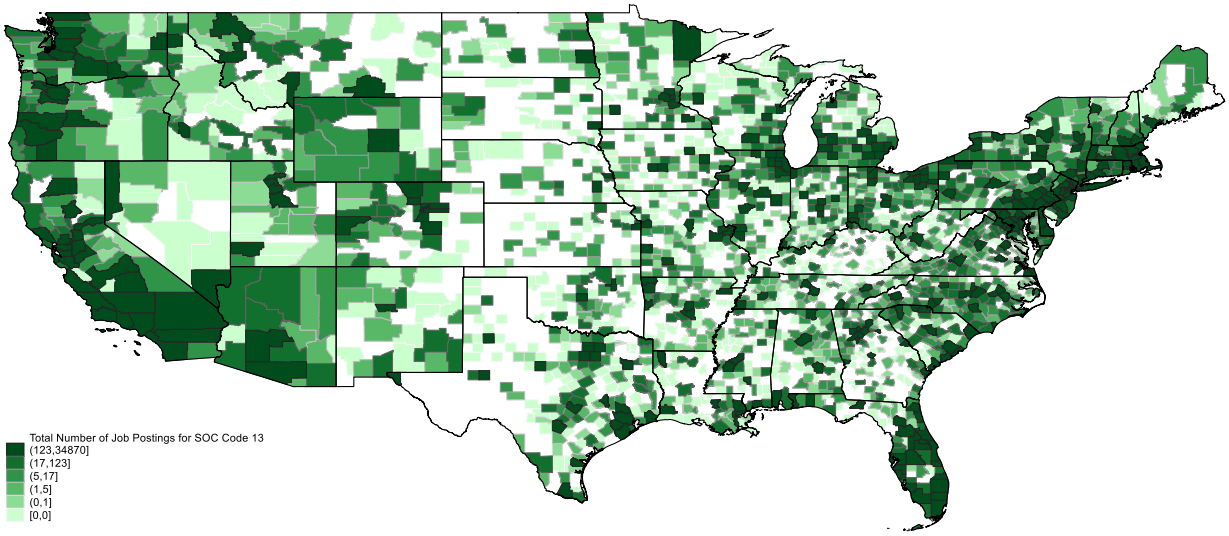
Figure 2: Geographic Maps of Human Capital Investment in the Financial Sector

Panel A: Relationship Bankers



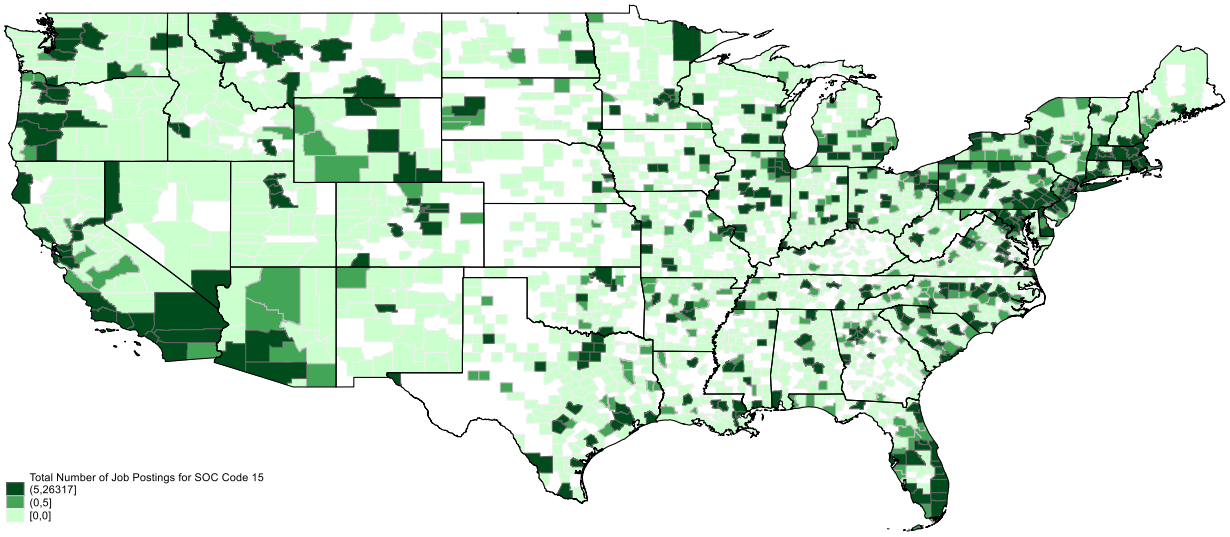
This figure shows the geographic map of human capital investment for relationship bankers of sample banks. The darker the color, the more job postings the sample banks posted for the relevant workforce.

Panel B: Loan Officers



This figure shows the geographic map of human capital investment for loan officers of sample banks. The darker the color, the more job postings the sample banks posted for the relevant workforce.

Panel C: Technology Professionals



This figure shows the geographic map of human capital investment for technology professionals of sample banks. The darker the color, the more job postings the sample banks posted for the relevant workforce.

Table 1. Sample Construction

This table displays the sample construction. The total sample of bank-county-year observation ends up with 155,887 with 109 unique banks in the sample. The sample period is 2013-2021.

	Observations
Banks covered in LinkUp, CFPB, and HMDA datasets	254,753
Less: Drop banks operating in investment banking services[11].	(15,907)
Less: Drop for years before 2013	(73,275)
Less: Missing information to compute bank-level control variables	(6,868)
Less: Missing information to compute county-level control variables	(2,816)
Total sample of bank-county-year observations	155,887
Number of unique banks	109

[11] I drop banks with investment banking service fees scaled by net interest income greater than one percent. I also visit and confirm sample banks' official websites to check whether sample banks' major business areas and operations are commercial banking (or personal banking), rather than investment banking.

Table 2. Summary Statistics

Panel A: Human Capital Investment of Sample Banks

This table presents descriptive statistics of banks' job postings by the two-digit Standard Occupational Classification (SOC) codes in descending order. I consider the four major categories that account approximately 85 percent of the entire job postings in commercial banks.

No	Job Titles in Banking	SOC Codes	SOC Titles	Frequency	Percent
1	***Tellers***	***43***	***Office and administrative support occupations***	**519,366**	**43.76**
2	***Loan officers***	***13***	***Business and financial operations occupations***	**227,534**	**19.17**
3	***Relationship bankers***	***41***	***Sales and related occupations***	**166,656**	**14.04**
4	***Technology professionals***	***15***	***Computer and mathematical occupations***	**75,344**	**6.35**
5		*11*	*Management occupations*	166,881	14.06
6		*99*	*Job postings with missing the SOC codes*	6,080	0.51
7		*51*	*Production occupations*	3,504	0.30
8		*23*	*Legal occupations*	3,056	0.26
9		*27*	*Arts, design, entertainment, sports, and media occupations*	3,054	0.26
10		*33*	*Protective service occupations*	2,728	0.23
11		*49*	*Installation, maintenance, and repair occupations*	2,598	0.22
12		*25*	*Educational instruction and library occupations*	1,898	0.16

13	*17*	*Architecture and engineering occupations*	1,756	0.15
14	*19*	*Life, physical, and social science occupations*	1,302	0.11
15	*21*	*Community and social service occupations*	892	0.08
16	*53*	*Transportation and material moving occupations*	776	0.07
17	*29*	*Healthcare practitioners and technical occupations*	676	0.06
18	*37*	*Building and grounds cleaning and maintenance occupations*	618	0.05
19	*47*	*Construction and extraction occupations*	544	0.05
20	*35*	*Food preparation and serving related occupations*	495	0.04
21	*39*	*Personal care and service occupations*	515	0.04
22	*31*	*Healthcare support occupations*	300	0.03
23	*55*	*Military specific occupations*	157	0.00
24	*45*	*Farming, fishing, and forestry occupations*	65	0.00
		Total		**100.00**

Panel B: Descriptive Statistics

This table reports the descriptive statistics for the variables. The sample consists of 155,887 bank-county-year observations. All variables are defined in Appendix A.

Variable	Obs.	Mean	Median	S.D.	Min	Max
Complaints	155,887	0.001052	0	0.007066	0	0.0625
Relationship Bankers	155,887	0.002881	0	0.012312	0	0.085505
Loan Officers	155,887	0.002048	0	0.009008	0	0.06282
Technology Professionals	155,887	0.002709	0.001386	0.003698	0	0.016493
Tellers	155,887	0.015912	0	0.057231	0	0.379073
Size	155,887	17.64537	17.81177	1.127564	15.01551	19.41484
ROA	155,887	0.012085	0.010364	0.010457	-0.03818	0.061172
Equity	155,887	0.11903	0.117349	0.021226	0.06609	0.183691
Deposits	155,887	0.77497	0.776019	0.049996	0.582477	0.930826
Total Population	155,887	9.255238	9.429801	0.861873	6.92968	10.69324
Median Income	155,887	10.26172	10.2394	0.276352	9.648434	11.03836
Median Age	155,887	3.725587	3.723113	0.109493	3.462606	4.004022
% Minority Population	155,887	21.97029	18.50000	15.86763	2.200000	72.40000
% Male Population	155,887	0.498867	0.497205	0.01952	0.446784	0.566679
% Unemployment	155,887	7.403928	7.00000	2.841842	2.50000	16.30000

Table 3. The Effects of Human Capital Investment on Financial Service Quality

This table presents results that examine the effects of human capital investment of banks on the quality of financial services. The dependent variables in columns 1 through 6 are the percentages of customer complaints that are defined as the number of mortgage loans complaints divided by total number of mortgage loans. The key independent variables are three major human capital investment in commercial banking, that are *Relationship bankers, Loan officers,* and *Tech professionals*. Control variables are bank size, ROA, percentage of equity, percentage of deposits, total population, median family income, median age, percentage of minority population, percentage of male population, and unemployment rate. All variables are defined in Appendix A. The standard errors are clustered at the bank level and statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

	% Bank Consumer Complaints					
	(1)	(2)	(3)	(4)	(5)	(6)
Relationship Bankers	**-0.04186***** **(-2.75)**	**-0.03985****** **(-2.23)**	**-0.04615****** **(-2.41)**	**-0.04146***** **(-2.77)**	**-0.04825***** **(-3.15)**	**-0.05099***** **(-3.31)**
Loan Officers	0.01805 (0.73)	-0.01447 (-0.40)	-0.01733 (-0.48)	0.01702 (0.67)	0.01358 (0.53)	0.00865 (0.39)
Technology Professionals	-0.08298 (-0.44)	0.13983 (1.07)	0.14533 (1.10)	-0.06245 (-0.49)	-0.06229 (-0.46)	-0.05573 (-0.43)
Size	-0.00324 (-1.44)	0.00183* (1.66)	0.00184* (1.67)	-0.00039 (-0.11)	-0.00020 (-0.06)	-0.00022 (-0.06)
ROA	0.03281 (1.08)	-0.05291 (-1.09)	-0.05777 (-1.13)	0.02346 (0.67)	0.02150 (0.60)	0.02312 (0.65)
Equity	0.01329 (0.39)	0.02515 (0.56)	0.02605 (0.55)	-0.00461 (-0.13)	-0.00629 (-0.17)	-0.00441 (-0.12)
Deposits	-0.02889 (-1.53)	-0.00725 (-0.44)	-0.00721 (-0.44)	-0.01656 (-1.01)	-0.01668 (-1.11)	-0.01621 (-0.99)

Total Population	0.00132*	0.00152**	0.00163**	0.00136*	0.00142**	-0.01407*
	(1.91)	(2.28)	(2.55)	(1.98)	(2.42)	(-1.73)
Median Income	0.00348**	0.00322**	0.00402**	0.00335**	0.00427**	-0.00148
	(2.20)	(2.19)	(2.33)	(2.17)	(2.25)	(-0.41)
Median Age	0.00270*	0.00485***	0.00405**	0.00392**	0.00363**	-0.00408
	(1.90)	(2.69)	(2.15)	(2.31)	(2.12)	(-0.92)
% Minority Population	-0.00000	0.00000	-0.00000	0.00001	0.00001	-0.00003
	(-0.41)	(0.33)	(-0.06)	(0.68)	(0.65)	(-0.65)
% Male Population	0.00972	0.00979	0.00810	0.01011	0.00647	0.00615
	(1.23)	(1.26)	(1.32)	(1.24)	(0.92)	(0.80)
% Unemployment	0.00032**	0.00024*	0.00030	0.00023*	0.00031*	0.00025
	(2.59)	(1.71)	(1.62)	(1.73)	(1.69)	(1.01)
Constant	0.01695	-0.09696**	-0.10311**	-0.04407	-0.05472	0.17762*
	(0.67)	(-2.35)	(-2.12)	(-0.83)	(-1.04)	(1.92)
Bank FE	Yes	No	No	Yes	Yes	Yes
Year FE	No	Yes	No	Yes	No	Yes
(State × Year) FE	No	No	Yes	No	Yes	No
County FE	No	No	No	No	No	Yes
Observations	155,887	155,887	155,887	155,887	155,887	155,887
Adjusted R^2	0.010	0.003	0.003	0.011	0.011	0.006

Table 4. The Effects of Human Capital Investment in Other Counties on Financial Service Quality

This table presents results that examine whether human capital investment in other counties affects the financial service quality in a county. The dependent variables in columns 1 through 6 are the percentages of customer complaints that are defined as the number of mortgage loans complaints divided by total number of mortgage loans. The key independent variables are three major human capital investment in commercial banking, that are *Relationship bankers, Loan officers,* and *Tech Professionals*. I proxy other counties' human capital investment by aggregating the entire job postings in other counties for the three major functions in commercial banking Control variables are bank size, ROA, percentage of equity, percentage of deposits, total population, median family income, median age, percentage of minority population, percentage of male population, and unemployment rate. All variables are defined in Appendix A. The standard errors are clustered at the bank level and statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

	% Bank Consumer Complaints					
	(1)	(2)	(3)	(4)	(5)	(6)
Relationship Bankers	**-0.01171**	**-0.00379**	**-0.00655**	**-0.01246**	**-0.02129**	**-0.01233**
in Other Counties	**(-0.54)**	**(-0.12)**	**(-0.20)**	**(-0.64)**	**(-0.93)**	**(-0.63)**
Loan Officers	0.00176	0.01680	0.01397	-0.01230	-0.01493	-0.00898
in Other Counties	(0.14)	(0.31)	(0.25)	(-0.76)	(-0.81)	(-0.55)
Technology Professionals	-0.07809	0.07438	0.09180	-0.00501	0.01636	-0.01670
in a Bank	(-0.39)	(0.38)	(0.47)	(-0.03)	(0.10)	(-0.11)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	No	No	Yes	Yes	Yes
Year FE	No	Yes	No	Yes	No	Yes
(State × Year) FE	No	No	Yes	No	Yes	No
County FE	No	No	No	No	No	Yes
Observations	155,887	155,887	155,887	155,887	155,887	155,887
Adjusted R^2	0.010	0.003	0.003	0.011	0.011	0.006

Table 5. Types of Consumer Complaints

This table presents results that examine the effects of human capital investment of banks on types of bank consumer complaints. The dependent variables in columns 1 through 5 are the percentages of consumer complaints issues behind why they consumers complain against a bank, defined as the number of mortgage loans complaints by complaint issues divided by total number of mortgage loans. The key independent variables are three major human capital investment in commercial banking, that are *Relationship bankers, Loan officers,* and *Tech professionals*. Control variables are bank size, ROA, percentage of equity, percentage of deposits, total population, median family income, median age, percentage of minority population, percentage of male population, and unemployment rate. All variables are defined in Appendix A. The standard errors are clustered at the bank level and statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

	% Bank Consumer Complaints by Issues			
	(1) *Loan collection*	(2) *Loan service*	(3) *Loan application*	(4) *Others*
Relationship Bankers	**-0.01577**	**-0.02117*** **	**-0.00470** **	**-0.00658** **
	(-1.54)	**(-3.17)**	**(-2.23)**	**(-2.20)**
Loan Officers	0.01866	-0.01707*	0.00457	0.00745
	(1.12)	(-1.77)	(0.73)	(1.16)
Technology Professionals	-0.19777*	0.15483**	-0.01990	-0.00021
	(-1.74)	(2.52)	(-1.30)	(-0.01)
Controls	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
(State × Year) FE	Yes	Yes	Yes	Yes
Observations	155,887	155,887	155,887	155,887
Adjusted R^2	0.008	0.007	0.001	0.000

Table 6. Bank Responses to Consumer Complaints

This table presents results that examine the effects of human capital investment of banks on how banks respond to consumer complaints. The dependent variables in columns 1 through 3 are the percentages of consumer complaints by banks responses, defined as the number of mortgage loans complaints by bank responses divided by total number of mortgage loans. The key independent variables are three major human capital investment in commercial banking, that are *Relationship bankers, Loan officers,* and *Tech professionals*. Control variables are bank size, ROA, percentage of equity, percentage of deposits, total population, median family income, median age, percentage of minority population, percentage of male population, and unemployment rate. All variables are defined in Appendix A. The standard errors are clustered at the bank level and statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

	% Bank Consumer Complaints by Responses		
	(1) *Complaints Closed with Explanation*	(2) *Complaints Closed with Non-monetary Relief*	(3) *Complaints Closed with Monetary Relief*
Relationship Bankers	**-0.03763*****	**-0.00986****	**-0.00004**
	(-2.93)	**(-2.36)**	**(-0.02)**
Loan Officers	0.00664	0.00825	-0.00238
	(0.38)	(1.04)	(-0.53)
Technology Professionals	-0.09846	-0.00791	0.03937
	(-0.96)	(-0.35)	(1.56)
Controls	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
(State × Year) FE	Yes	Yes	Yes
Observations	155,887	155,887	155,887
Adjusted R^2	0.010	0.001	0.002

Table 7. Cross-Sectional Analysis: Financial Literacy

This table presents results that examine whether the effects of relationship bankers are more pronounced depending on financial literacy. I proxy financial literacy by the proportion of the population with a bachelor's degree in a county measured in 2013. The dependent variables in columns 1 and 2 are the percentages of consumer complaints by banks responses, defined as the number of mortgage loans complaints by bank responses divided by total number of mortgage loans. The key independent variables are three major human capital investment in commercial banking, that are *Relationship bankers, Loan officers,* and *Tech professionals*. Control variables are bank size, ROA, percentage of equity, percentage of deposits, total population, median family income, median age, percentage of minority population, percentage of male population, and unemployment rate. All variables are defined in Appendix A. The standard errors are clustered at the bank level and statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

	% Bank Consumer Complaints	
	(1)	(2)
	Lower	***Higher***
	Financial Literacy	*Financial Literacy*
Relationship Bankers	**-0.05416*****	**-0.04903***
	(-3.16)	**(-1.84)**
Loan Officers	-0.00714	0.01962
	(-0.52)	(0.54)
Technology Professionals	-0.01579	-0.10237
	(-0.13)	(-0.57)
Controls	Yes	Yes
Bank FE	Yes	Yes
County FE	Yes	Yes
Year FE	Yes	Yes
Observations	78,432	77,433
Adjusted R^2	0.007	0.008

Table 8. Robustness Tests

Panel A: Sample Period before Covid-19 Lockdown (YR2013-2019)

This table presents robustness tests to examine whether the results are robust for the sample period before Covid-19 lockdown. In this analysis, I proxy human capital investment as the number of job postings divided by total number of mortgage loans. The dependent variables in columns 1 through 6 are the percentages of customer complaints that are defined as the number of mortgage loans complaints divided by total number of mortgage loans. Control variables are bank size, ROA, percentage of equity, percentage of deposits, total population, median family income, median age, percentage of minority population, percentage of male population, and unemployment rate. All variables are defined in Appendix A. The standard errors are clustered at the bank level and statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

	% Bank Consumer Complaints					
	(1)	(2)	(3)	(4)	(5)	(6)
Relationship Bankers	**-0.05025*****	**-0.04527****	**-0.05261****	**-0.04995*****	**-0.05816*****	**-0.06130*****
	(-2.67)	**(-2.31)**	**(-2.46)**	**(-2.65)**	**(-3.07)**	**(-3.18)**
Loan Officers	0.02599	-0.01455	-0.01760	0.02597	0.02171	0.01684
	(0.87)	(-0.33)	(-0.39)	(0.87)	(0.71)	(0.68)
Technology Professionals	-0.28017	0.14476	0.15174	-0.22122	-0.21621	-0.21490
	(-1.12)	(0.98)	(1.01)	(-1.20)	(-1.12)	(-1.15)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	No	No	Yes	Yes	Yes
Year FE	No	Yes	No	Yes	No	Yes
(State × Year) FE	No	No	Yes	No	Yes	No
County FE	No	No	No	No	No	Yes
Observations	122,971	122,971	122,971	122,971	122,971	122,971
Adjusted R^2	0.012	0.002	0.002	0.012	0.012	0.006

Panel B: Human Capital Investment with Three-Digits SOC Codes

This table presents results that examine the effects of human capital investment of banks on the quality of financial services. The dependent variables in columns 1 through 6 are the percentages of customer complaints that are defined as the number of mortgage loans complaints divided by total number of mortgage loans. The key independent variables are three major human capital investment in commercial banking, that are *Relationship bankers*, *Loan officers*, and *Tech professionals*. Control variables are bank size, ROA, percentage of equity, percentage of deposits, total population, median family income, median age, percentage of minority population, percentage of male population, and unemployment rate. All variables are defined in Appendix A. The standard errors are clustered at the bank level and statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

	% Bank Consumer Complaints					
	(1)	(2)	(3)	(4)	(5)	(6)
Relationship Bankers	**-0.05511*****	**-0.05010****	**-0.05661****	**-0.05433*****	**-0.06117*****	**-0.06303*****
With SOC 413	**(-2.71)**	**(-2.28)**	**(-2.54)**	**(-2.76)**	**(-3.22)**	**(-3.35)**
Loan Officers	0.02626	-0.01396	-0.01479	0.02548	0.02433	0.02129
With SOC 132	(1.01)	(-0.34)	(-0.36)	(0.97)	(0.91)	(0.94)
Technology Professionals	-0.08563	0.14574	0.15229	-0.06239	-0.06241	-0.05707
	(-0.45)	(1.10)	(1.14)	(-0.50)	(-0.46)	(-0.45)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	No	No	Yes	Yes	Yes
Year FE	No	Yes	No	Yes	No	Yes
(State × Year) FE	No	No	Yes	No	Yes	No
County FE	No	No	No	No	No	Yes
Observations	155,887	155,887	155,887	155,887	155,887	155,887
Adjusted R^2	0.010	0.003	0.003	0.011	0.011	0.006

Table 9. Falsification Test: Tellers

This table presents the falsification test results that examine whether human capital investment in tellers affects the financial service quality. The key independent variable is human capital investment in *Tellers*. Control variables are bank size, ROA, percentage of equity, percentage of deposits, total population, median family income, median age, percentage of minority population, percentage of male population, and unemployment rate. All variables are defined in Appendix A. The standard errors are clustered at the bank level and statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

	% Bank Consumer Complaints					
	(1)	(2)	(3)	(4)	(5)	(6)
Tellers	-0.00237	-0.00383	-0.00472	-0.00231	-0.00335	-0.00518
	(-0.54)	(-0.62)	(-0.74)	(-0.54)	(-0.79)	(-1.17)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	No	No	Yes	Yes	Yes
Year FE	No	Yes	No	Yes	No	Yes
(State × Year) FE	No	No	Yes	No	Yes	No
County FE	No	No	No	No	No	Yes
Observations	155,887	155,887	155,887	155,887	155,887	155,887
Adjusted R^2	0.010	0.003	0.003	0.011	0.011	0.006