# *Bank Access, Insurance Markets and Financial Structure on the International Risk Sharing*

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**Abstract**

This project re-investigates the extent of international consumption risk sharing across countries and time. While there are some works documenting that financial globalization/openness is related to the degree of risk sharing, we contribute to the current literature by further exploring the role of banking sector outreach and insurance sector development on the extent of international risk sharing. In addition, we also explore whether a country's financial structure (bank-based vs market-based) displays any discernible risk-sharing effect. Overall, the empirical results indicate that, while there is no significant evidence of risk-sharing effect of insurance sector development and financial structure, the impact of financial sector outreach on improving the degree of risk sharing is economically large and statistically significant (especially in the middle-income countries). Moreover, the key finding is robust to a collection of sensitivity checks, e.g., restricted sample, different consumption measures, alternative empirical specifications/approaches, serially correlated errors, endogeneity, and outliers.

Keywords: risk sharing, banking access, insurance market development, financial structure

## Introduction

Whether and to what extent that (consumption) risk can be shared across individuals (Mace, 1991; Cochrane, 1991; Townsend, 1994; Hayashi et al., 1996; Schulhofer-Wohl, 2011), regions (Del Negro, 2002; Demyanyk et al., 2007; Hoffmann and Shcherakova-Stewen, 2011; Balli et al., 2012; Chan et al., 2014), and countries (Obstfeld, 1994; Lewis, 1996; Crucini, 1999; Sørensen et al., 2007; Asdrubali and Kim, 2008a, 2008b; Antonakakis and Scharler, 2012; Artis and Hoffmann, 2012; Baxter, 2012) over time has been an important issue attracting the interest of both academic researchers and policy makers. However, as argued in Lewis (1996), while standard international business cycle models under the assumption of complete markets usually indicate that consumption growth rates should be strongly correlated with each other and more highly correlated than output growth rates, most recent empirical studies have rejected the theoretical prediction of complete risk sharing using both international and intranational data.[1]

In this respect, there are increasing empirical works examining whether/how the extent of risk sharing is related to certain characteristics such as the degree of financial friction/constraints in a country. For instance, Kose, et al. (2009) assess the effect of financial globalization on the degree of international risk sharing over a large group of industrial and developing (emerging) countries. While, theoretically, financial globalization should help countries insure against idiosyncratic risk, Kose, et al. (2009) find no discernible evidence in support of the view that financial globalization improves international risk sharing for developing economies.[2] There is limited evidence that industrial countries attain better risk sharing in the recent globalization era, though. In sharp contrast, Artis and Hoffmann (2008) distinguish between permanent and transitory fluctuations in output (income) because consumption responds mainly to permanent shocks and it is more difficult to insure against permanent than against transitory fluctuations. They find that the ratio of permanent country-specific risk shared internationally through world financial markets has increased significantly, from less than

[1] Starting from Asdrubali et al. (1996), another line of literature focuses on measuring the contribution of alternative channels to overall smoothing, e.g., Sørensen and Yosha (1998), Becker and Hoffmann (2006), Afonso and Furceri (2008), Asdrubali and Kim (2004, 2009), and Balli et al. (2012). According to Asdrubali et al. (1996), capital markets, federal government and credit markets smooth 39, 13 and 23 percent of shocks to U.S. gross state product, respectively. The remaining 25 percent are not smoothed.

[2] Bai and Zhang (2012) demonstrate that the key to understanding this puzzling fact is that existing studies often assume that international financial markets are frictionless, but actual markets are far from frictionless due to incomplete financial contracts and limited contract enforceability.

30 percent before 1980 to more than 60 percent during the 1990s.

Similarly, Balli, et al. (2012) examine channels of international risk sharing, through savings,factor income flows and particularly the role of capital gains between EMU, EU and OECD countries over the 1992-2007 period. They argue that the capital gains channel is under-explored but is important given the quadrupling of foreign assets and liabilities during the era of financial globalization. Specifically, they show that risk sharing from capital gains is about 6 percent for all three groups of countries. Moreover, Fratzscher and Imbs (2009) consider the role of transaction costs in international investment in influencing the degree of international risk sharing, both in a multilateral and bilateral context. Especially, Fratzscher and Imbs (2009) show theoretically that financial assets with large transaction costs are associated with little international risk sharing, and offer empirical evidence in support that the bulk of risk sharing is related to investment in equities and bonds (lower transaction costs), but not to foreign direct investment or international bank loans (higher transaction costs).[3]

In contrast to financial globalization/openness, this project contributes to the existing literature by considering the roles of three additional aspects of the financial institutions andmarkets. Firstly, we assess the role of financial sector outreach in international consumption risk sharing across the world. Among which, we are mostly interested in knowing if the extent of financial sector outreach (banking access), as discussed in Beck et al. (2007, 2008), is related to the degree of international consumption risk sharing. In particular, they use data on the number of branches and ATMs per capita and per square kilometer to capture the penetration of the banking system, and interpret higher branch and ATM intensity as indicative of better access to the use of financial services by households and enterprises. Moreover, they also consider measures on the number of loan and deposit accounts per capita and on the average loan and deposit sizes relative to GDP per capita, and interpret a larger number of loan and deposit accounts per capita and smaller average loan and deposit amounts relative to GDP per capita as indicating the (actual) use of deposit and credit services by a greater share of the population and by

[3] Hoffmann and Shcherakova-Stewen (2011) find that the consumption risk sharing among U.S. states appears to be higher in booms and lower in recessions. As in Demyanyk et al. (2007), who find that interstate income smoothing increases by approximately 15 percent on average after bank deregulation, Hoffmann and Shcherakova- Stewen (2011) show that banking deregulation enhances consumption risk sharing over the business cycle through improving the ability of small businesses to obtain credit (or, alleviating the financial friction/constratints facing the small businesses).

smaller clients.[4] Data show that barriers to access and use of banking services vary a lot around the world, and theories suggest that lacks of access to (and barriers to use) financial services are commonly the key mechanism for generating persistent income inequality, poverty and slower economic growth, e.g., Honohan (2008) and Beck et al. (2009). Recently, Beck et al. (2014) show that firms in countries with better credit information-sharing systems and higher branch penetration evade taxes to a lesser degree. Thus, we are interested in testing whether financial sector reforms that promote financial inclusion matter for the sharing of consumption risk over time and across countries.

Secondly, we explore whether the development of insurance sector is beneficial for the international risk sharing and consumption smoothing. To date, there are plenty of studies documenting that the advance of financial institutions and markets is strongly associated with higher economic growth, lower growth volatility, and more equal distribution of income, e.g., Levine et al. (2000), Raddatz (2006), and Beck et al. (2007), to name a few. Conceptually, financial development, by alleviating the financial constraints facing individuals and firms, should result in favorable risk sharing across business cycles. Likewise, there are empirical works investigating if better development of banking systems and stock markets is connected to higher level of risk sharing, e.g., Schmitz (2010, 2013). Similarly, it is also argued that "a sound national insurance and reinsurance market is an essential characteristic of economic growth".[5] The recent contributions such as Arena (2008), Lee (2013), and Lee et al. (2013) confirms the aforementioned view that there is a strong and positive insurance-growth nexus. Due to its particular and important role in risk management (identify, measure, manage risk), the insurance markets serve as providers of risk transfer and indemnification, and help handle non-diversifiable risk more efficiently, e.g., Brainard (2008). As such, we will explore whether the development of insurance markets plays any discernible role in the degree of international risk sharing.

Thirdly, we will investigate the relative merits of financial structure on the extent of international risk sharing. While there are plenty of empirical evidences in supporting the view that developments of banking system as well as stock markets enhance economic

[4] Note that Beck et al. (2007, 2008) distinguish between the access to and the actual use of financial services.

[5] As in Outreville (2013), the quote is acknowledged at its first session of the United Nations Conference on Trade and Development (UNCTAD) in 1964. Moreover, in 2010, insurance companies across the world write US$4,340 billion in direct premiums, which are equivalent to (approximately) 7 percent of global GDP used to purchase insurance products.

growth in general, there exist two contrasting (theoretical) views regarding the relative benefits of banks and stock markets in fostering economic growth. The proponents of bank-based financial systems contend that banking systems are better at boosting economic performance through their comparative skills in producing information and improving capital allocation and corporate governance, ameliorating risk and enhancing investment efficiency, and mobilizing capital to take advantage of economies of scale, e.g., Levine (2002, p. 399). On the contrary, the supporters of market-oriented financial systems emphasize the growth-enhancing role of well-functioning stock markets by raising higher motive to research firms as it is much easier to profit from this information in a large, liquid market, encouraging better corporate governance, and facilitating more efficient risk management, e.g., Levine (2002, p. 400). Empirically, most existing studies offer convincing evidence in support that neither bank-based view nor market-based view is supported by the data, e.g., Beck and Levine (2002), Levine (2002), Demirg¨u¸c-Kunt and Maksimovic (2002), and Ndikumana (2005).[6] Thus, given its importance in the literature, we proceed to investigate whether international risk sharing is better achieved, if any, in a bank-oriented or market-oriented country.

This paper is organized as follows. Section 2 reviews the empirical specification. Section 3 describes the data sources. Section 4 presents our main findings along with additional checks of robustness. Section 5 concludes.

**Empirical Models**

There are alternative empirical frameworks for testing the hypothesis of international risk sharing. Following Lewis (1996), Baxter (2012), and Fuleky et al. (2014), our main specification for testing the hypothesis of consumption risk sharing can be implemented by running the following (level) regression:

$$lnc_{it} - lnc_t^w = \alpha_i + \beta(lny_{it} - lny_t^w) + \epsilon_{it} \quad (1)$$

where $\alpha_i$ is a country-specific (fixed) effect, $c_{it}$ ($y_{it}$) denotes a measure of consumption (GDP) per capita for country i in year t, and $c_t^w$($y_t^w$) represents the

[6] However, Tadesse (2002), Luintel et al. (2008), and Yeh et al. (2013) show that financial structure matters for economic performance.

aggregate (world) consumption (GDP) per capita in year t, respectively. In contrast, Asdrubali et al. (1996), Sørensen et al. (2007), and Kose et al. (2009) consider the following (differenced) specification for assessing consumption risk sharing:

$$\Delta \ln c_{it} - \Delta \ln c_t^w = \alpha_i + \beta(\Delta lny_{it} - \Delta lny_t^w) + \epsilon_{it} \quad (2)$$

where $\Delta \ln c_{it} = ln - lnc_{i,t-1}$, and the other terms are defined analogously. In this framework, the consumption and income indicators entering the regression as per capita consumption growth and per capita GDP growth, respectively.

For both empirical frameworks, the aggregate component of each variable is subtracted from the corresponding country's variable since the aggregate fluctuations can not be eliminated by risk sharing, As a result, the difference between the country's and aggregate component of each variable represents the idiosyncratic (country-specific) fluctuations in that variable. The null hypothesis of (perfect) consumption risk sharing test is β = 0, where β captures the average degree of synchronization between countries' idiosyncratic consumption growth and GDP growth during the sample period. The smaller the co-movement, the more consumption is buffered against GDP fluctuations. Thus, β can be regarded as the degree of the departure from perfect risk sharing. In fact, as suggested by Asdrubali et al. (1996), the scalar 1 − β can be used to assess the extent of consumption risk sharing over the time-period examined. Given a panel data set across countries and over time, standard fixed-effect (FE) and/or random-effect (RE) estimators can be implemented to estimate/test the main coefficient of nterest β.

In order to explore whether financial sector outreach plays any significant role in determining the degree of risk sharing, we extend equation (1) to include an interaction term between the idiosyncratic component of GDP, i.e., ln $y_{it} - y_t^w$ , and an indicator of banking access (denoted by 'accessit'). That is, we actually estimate the following regression using panel data:

$$\ln c_{it} - lnc_t^w = \alpha_i + \beta(lny_{it} - lny_t^w) + \mathrm{K}[access_{it} \times (lny_{it} - lny_t^w)] + \epsilon_{it} \quad (3)$$

Clearly, the extent of risk sharing is a function of banking access:

$$\frac{\partial(\ln c_{it} - \ln c_t^w)}{\partial(\ln y_{it} - \ln y_t^w)} = \beta + \mathrm{K} \times access_{it}$$

When the estimated coefficient of the interaction term K is (significantly) negative, it would offer strong evidence in favor of the hypothesis that greater banking access is associated with higher degree of risk sharing achieved by an economy. In the same spirit of Asdrubali et al. (1996), one can use $(1 - \beta - \kappa \times access_{it})$ to measure the average amount of consumption risk sharing obtained by country i during the time-period t.

In addition to the standard fixed-effect and random-effect estimators, we also check whether our main results are sensitive to the following situations. (i) We allow for the presence of serially correlated errors (of first-order) in equation (1), i.e., $\epsilon_{it} = \rho\epsilon_{i,t-1} + v_{it}$ (ii) We also consider the (potential) endogeneity of the right-hand side explanatory variables, and use their lagged terms as instrumental variables to re-estimate the model. (iii) We check whether our results are driven by the outliers. In particular, we employ two distinct approaches. The first one is the robust regression of Hamilton (1991), and the other one is the fixed-effect quantile (median) regression approach of Canay (2011). (iv) Instead of using the interaction term as in (1), we verify the results using a finite mixture (endogenous switching) model to assess the effect of banking access on the extent of risk sharing.[7]

**Data Sources**

The key consumption and output (income) data are taken from the World Development Indicators (WDI), World Bank. In particular, we consider the private consumption (household final consumption expenditure), and the public consumption (general government final consumption expenditure). Moreover, the output/income variable is the gross domestic product (GDP). In later analysis, both consumption and output variables are in per capita form.

Following Beck et al. (2007), our first set of interaction variables seeks to measure the extent of financial (banking) sector outreach across countries and over time. More specifically, it includes: (i) commercial bank branches per 1000 per square kilometer ('Branches I'), (ii) commercial bank branches per 100,000 adults ('Branches II'), (iii) automated teller machines per 1,000 per square kilometer ('ATMs I'), (iv) automated teller machines per 100,000 adults ('ATMs II'). Note that these four indicators measure

[7] Please see Hovakimian and Titman (2006) for an application of the endogenous switching regression to examine the importance of financial constraints for firms' investment.

the degree of financial sector outreach in terms of access to banks' physical outlets. Particularly, the indicators of branches/ATMs per square kilometer and per 100,000 adults help characterize the geographic and demographic penetration of the banking sector, respectively. Higher geographic (demographic) penetration would thus indicate smaller distance (fewer potential clients per branch or ATM), therefore easier access. In addition, it also contains: (v) number of loan accounts with commercial banks per 1,000 adults ('Borrowers'), and (vi) number of deposit accounts with commercial banks per 1,000 adults ('Depositors'). These last two indices measure the use of, rather than the access to, banking services. Generally speaking, it would be expected that a larger number of loans and deposits per capita indicates higher use of banking services. Table A1 provides a list of countries under investigation along with average values of these six banking access indicators for each country, whenever available. Table A2 offers summary statistics and pairwise correlations for these six variables. Note that the correlations are all positive and statistically significant at 1% level.

The second set of interaction variables intends to measure the development of insurance sector. Following Beck et al. (2010), we rely mainly upon two alternative indicators to stand for the size (development) of the insurance sector. The first index is life insurance penetration ('InsLife', proxied by the ratio of life insurance premiums to GDP), and the second one is nonlife insurance penetration ('InsNonlife', proxied by the ratio of nonlife insurance premiums to GDP). These two indicators gauge total premium revenue in life and nonlife insurance business lines relative to economic activity. Since the premium volume is the quantity of insurance coverage times its price, higher volumes thus indicate a deeper insurance market.[8]

The third/last set of interaction variables aims to measure the extent of financial structure, i.e., bank-oriented or market-oriented. Following Levine (2002), three distinct aggregate ndicators of financial system structure are considered. (i) The first one is a measure of the activity of stock markets relative to that of banks, i.e., 'FSA', which is defined as the logarithm of the total value traded ratio (the value of domestic equities traded on domestic exchanges divided by GDP) divided by the private credit ratio (the claims on the private sector by deposit money banks divided by GDP). (ii) The second one is an indicator of the size of stock markets comparable to that of banks, i.e., 'FSS', which is defined as the logarithm of the market capitalization ratio (the ratio of listed shares to

[8] Instead, however, higher volumes may also represent less competition or efficiency.

GDP) divided by the private credit ratio. (iii) The third one is an index of the efficiency of stock markets relative to that of banks, i.e., 'FSE', which is defined as the logarithm of the total value traded ratio times overhead costs. Accordingly, higher values of 'FSA', 'FSS', and 'FSE' indicate a country is more market-oriented. All the sets of interaction variables are taken from the WDI, World Bank.

**Empirical Results**

In this section, we first present our key results using the fixed-effect estimator. We first use the private consumption data as our main consumption measure, and equation (1) as our primary empirical specification (Table 1). In addition, we restrict our sample to those countries with population more than 1 million to ensure our results are not driven by the 'small' countries (Table 2). Besides, we re-estimate the model with data on total consumption which is the sum of private and government consumption (Table 3). Further, instead of the level regression in (1), the differenced version in (2) is also estimated (Table 4). Moreover, we take into account the serially correlated errors (Table 5), the problem of endogeneity (Table 6), the possibility of outliers (Tables 7 and 8).

Table 1 displays outcomes for consumption risk sharing as a function of financial sector outreach for the whole sample. We focus on six banking access measures such as 'Branches I','Branches II', 'ATMs I', 'ATMs II', 'Borrowers', and 'Depositors', and experiment with each of these six measures in turn in our empirical analysis as the interaction term. It can be found that all the coefficients on output variable are significantly positive at 1% level across alternative specifications. More importantly, all the estimates on the interaction terms appear to be negative and statistically significant at 1% level across different measures of banking access. Thus, the evidences strongly indicate that the higher the access to and use of banking services in a country, the more the risk sharing within the country, and this main finding is robust to a variety of banking sector outreach indicators. The point estimates on the interaction terms are also economically meaningful. Taking the 'Branches I' index (in logarithmic form) for example,the coefficient is −0.052 which implies that a country increases commercial bank branches per 1000 per square kilometer by 1% will increase consumption risk sharing by about 5.2%. Similar explanations apply for other indicators.

In order to check our results are driven by the presence of small countries, we exclude the economies with population less than one million. Table 2 presents the restricted sample

outcomes. Clearly, the coefficient estimates on output and interaction terms remain virtually unchanged either in a qualitative and/or a quantitative manner. Accordingly, the extra results suggest that our main finding is unlikely to be driven by the inclusion of small economies. In addition, while we use the private consumption as our key indicator (for dependent variable) in Table 1 (and other Tables as well), we also consider the total consumption, i.e., the sum of private and government consumption, to see if our outcomes would change in a substantial way. Table 3 examines this possibility. We continue to find that all the coefficients on the interaction terms are negative in nature and statistically significant at 1% level. As such, it can be concluded that our results are insensitive to the use of alternative measures of consumption. Next, we turn to the differenced version of the empirical specification in equation (2). The results are outlined in Table 4. Overall, we can observe that the coefficients on the interaction terms remain negative as expected and statistically significant at 1% level across alternative banking access measures, supporting the hypothesis that better outreach of financial sector is associated with higher degree of risk sharing across countries and over time.

Since panel data contains both dimensions of cross section and time series. The possible presence of autocorrelated errors in the time-series dimension may invalidate our estimation/testing results and lead to inappropriate, if not incorrect, conclusion. Thus, we re-estimate the model in equation (1) by allowing for (first-order) serial correlation in the error term and report the outcomes in Table 5. It is found that all the estimated parameters on the interactive terms continue to be negative. Except for the 'Branches I' case, coefficients on the other interaction terms are statistically significant at 1–5% level. In addition to the problem of serial correlation, another econometric problem of endogeneity might emerge as consumption and output are likely to be jointly determined, or both caused by a third (worldwide) factor such as financial crisis. In this respect, the conventional fixed-effect estimator is neither unbiased nor consistent. As such, we rely upon the instrumental variable (IV) approach using internal instruments (lagged output and lagged interaction terms) to provide consistent estimates. Table 6 introduces the results. Again, the results are encouraging in that all interaction terms have the expected negative sign and most of them are significant at 1–5% level. In short, the view that better financial sector outreach leads to an improvement in risk sharing survives the problems of serially correlated errors and endogeneity.

Moreover, we check whether our main findings are robust the (possible) presence of outliers by two alternative methods. The first method is the robust regression approach,

and implemented by the Stata command 'rreg'. Basically, the algorithm begins by fitting the regression, calculating Cook's D, and excluding any observation for which D is larger than 1. Then, it performs a regression, calculates case weights from absolute residuals, and regresses again using those weights. Table 7 offers the robust estimation outcomes for equation (1). It can be seen that they are largely similar to the fixed-effect results (Table 1). The coefficients on the interaction terms remain negative and continue to be significant at 1% level. The second method is the recent fixed-effect quantile estimator of Canay (2011). In particular, Table 8 reports the results of the median (50% percentile) regression which is known to be robust to the presence of outliers. Similarly, despite the magnitudes (in absolute values) are generally smaller than those benchmark estimates in Table 1, all the estimated interaction coefficients have the expected negative sign and are highly significant at 1% level. As a whole, our findings of the beneficial risk-sharing effects of banking sector outreach are insensitive to outliers.

**Conclusion**

This paper investigates the potential benefits of access to and use of financial services, i.e., financial sector outreach, for the patterns of consumption risk sharing across a large panel of countries using a variety of empirical specifications and estimation approaches. By using the most comprehensive data on alternative indicators of banking sector outreach, the empirical results strongly indicate that greater access to and use of financial services is helpful in sharing consumption risk within a country, and the risk-sharing effects are most pronounced in the middle-income economies. The key finding is robust to a variety of checks, including restricted sample, different consumption measures, distinct empirical specification and model, serial correlation, endogeneity, and outliers. However, no significant evidence is detected for the development of insurance sector and financial system structure in determining the degree of consumption risk sharing.

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Table 1: Main Result

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Output | 0.996*** | 1.008*** | 0.905*** | 0.900*** | 1.021*** | 1.183*** |
| | (0.047) | (0.050) | (0.050) | (0.046) | (0.101) | (0.090) |
| Output × Branches I | -0.052*** | | | | | |
| | (0.011) | | | | | |
| Output × Branches II | | -0.058*** | | | | |
| | | (0.010) | | | | |
| Output × ATMs I | | | -0.034*** | | | |
| | | | (0.008) | | | |
| Output × ATMs II | | | | -0.020*** | | |
| | | | | (0.006) | | |
| Output × Borrowers | | | | | -0.028*** | |
| | | | | | (0.010) | |
| Output × Depositors | | | | | | -0.038*** |
| | | | | | | (0.007) |
| Constant | -0.299*** | -0.298*** | -0.290*** | -0.312*** | -0.507*** | -0.524*** |
| | (0.012) | (0.013) | (0.011) | (0.010) | (0.059) | (0.059) |
| Countries | 146 | 153 | 137 | 145 | 79 | 78 |
| Observations | 915 | 1058 | 835 | 972 | 495 | 441 |

† The dependent variable is consumption which is measured as $[\ln c_{it} - \ln(c_t^w)]$, and the main explanatory variable is output which is calculated as $[\ln(y_{it}) - \ln(y_t^w)]$. Branches I (II) is the bank branches per 1000 sq km (per 100,000 adults), and ATMs I (II) is the automated teller machines per 1000 sq km (per 100,000 adults), respectively. Borrowers and Depositors denote borrowers and depositors from commercial banks per 1,000 adults, respectively. Standard errors are in parentheses.***and** indicate significant at 1% and 5% level, respectively.

Table 2: Restricted Sample

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Output | 1.008*** | 1.032*** | 0.931*** | 0.940*** | 1.033*** | 1.199*** |
| | (0.047) | (0.051) | (0.052) | (0.049) | (0.099) | (0.087) |
| Output × Branches I | −0.050*** | | | | | |
| | (0.010) | | | | | |
| Output × Branches II | | −0.056*** | | | | |
| | | (0.010) | | | | |
| Output × ATMs I | | | −0.037*** | | | |
| | | | (0.008) | | | |
| Output × ATMs II | | | | −0.018*** | | |
| | | | | (0.008) | | |
| Output × Borrowers | | | | | −0.026*** | |
| | | | | | (0.009) | |
| Output × Depositors | | | | | | −0.037*** |
| | | | | | | (0.007) |
| Constant | −0.310*** | −0.301*** | −0.298*** | −0.315*** | −0.484*** | −0.498*** |
| | (0.014) | (0.016) | (0.013) | (0.013) | (0.062) | (0.061) |
| Countries | 124 | 130 | 115 | 121 | 73 | 72 |
| Observations | 839 | 969 | 758 | 881 | 475 | 421 |

† Same as Table 1 except that the sample is now restricted to countries with population larger than 1 million.

Table 3: Alternative Consumption Measure

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Output | 1.077*** | 1.101*** | 1.037*** | 1.030*** | 1.039*** | 1.162*** |
| | (0.029) | (0.032) | (0.030) | (0.029) | (0.043) | (0.050) |
| Output × Branches I | -0.042*** | | | | | |
| | (0.009) | | | | | |
| Output × Branches II | | -0.064*** | | | | |
| | | (0.009) | | | | |
| Output × ATMs I | | | -0.031*** | | | |
| | | | (0.006) | | | |
| Output × ATMs II | | | | -0.044*** | | |
| | | | | (0.005) | | |
| Output × Borrowers | | | | | -0.038*** | |
| | | | | | (0.007) | |
| Output × Depositors | | | | | | -0.034*** |
| | | | | | | (0.006) |
| Constant | -0.350*** | -0.352*** | -0.336*** | -0.332*** | -0.543*** | -0.594*** |
| | (0.046) | (0.044) | (0.048) | (0.046) | (0.060) | (0.060) |
| Observations | 915 | 1058 | 835 | 972 | 495 | 441 |

† The dependent variable is consumption which is measured as $[\ln c_{it} - \ln(c_t^w)]$, and the main explanatory variable is output which is calculated as $[\ln(y_{it}) - \ln(y_t^w)]$. Branches I (II) is the bank branches per 1000 sq km (per 100,000 adults), and ATMs I (II) is the automated teller machines per 1000 sq km (per 100,000 adults), respectively. Borrowers and Depositors denote borrowers and depositors from commercial banks per 1,000 adults, respectively. Standard errors are in parentheses. ***and ** indicate significant at 1% and 5% level, respectively.

Table 4: Alternative Specification

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Output | 1.517*** | 1.528*** | 1.556*** | 1.665*** | 2.182*** | 1.858*** |
| | (0.135) | (0.196) | (0.141) | (0.157) | (0.326) | (0.412) |
| Output × Branches I | -0.204*** | | | | | |
| | (0.058) | | | | | |
| Output × Branches II | | -0.211*** | | | | |
| | | (0.072) | | | | |
| Output × ATMs I | | | -0.163*** | | | |
| | | | (0.047) | | | |
| Output × ATMs II | | | | -0.209*** | | |
| | | | | (0.046) | | |
| Output × Borrowers | | | | | -0.281*** | |
| | | | | | (0.075) | |
| Output × Depositors | | | | | | -0.128*** |
| | | | | | | (0.069) |
| Constant | -0.014*** | -0.015*** | -0.013*** | -0.012*** | -0.011*** | -0.017*** |
| | (0.002) | (0.016) | (0.002) | (0.002) | (0.004) | (0.003) |
| Observations | 889 | 1031 | 814 | 950 | 485 | 428 |

† Same as Table 1 except that the dependent variable (consumption) is now measured as $[\Delta \ln c_{it} - \Delta \ln(c_t^w)]$, and the main explanatory variable (output) is similarly calculated as $[\Delta \ln y_{it} - \Delta \ln(y_t^w)]$

Table 5: Autoregressive Errors

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Output | 1.077*** | 1.088*** | 1.083*** | 1.086*** | 1.059*** | 1.111*** |
| | (0.031) | (0.034) | (0.031) | (0.030) | (0.045) | (0.056) |
| Output × Branches I | −0.014 | | | | | |
| | (0.010) | | | | | |
| Output × Branches II | | −0.024** | | | | |
| | | (0.011) | | | | |
| Output × ATMs I | | | −0.015** | | | |
| | | | (0.008) | | | |
| Output × ATMs II | | | | −0.026*** | | |
| | | | | (0.007) | | |
| Output × Borrowers | | | | | −0.029*** | |
| | | | | | (0.008) | |
| Output × Depositors | | | | | | −0.025*** |
| | | | | | | (0.008) |
| Constant | −0.360*** | −0.363*** | −0.342*** | −0.335*** | −0.555*** | −0.603*** |
| | (0.041) | (0.038) | (0.042) | (0.038) | (0.055) | (0.057) |
| Observations | 915 | 1058 | 835 | 972 | 495 | 441 |

† The dependent variable is idiosyncratic consumption which is measured as [ln cit−ln(cw t )], and the main explanatory variable is output which is calculated as [ln(yit) − ln(yw t )]. BranchesI (II) is the bank branches per 1000 sq km (per 100,000 adults), and ATMs I (II) is the automated teller machines per 1000 sq km (per 100,000 adults), respectively. Borrowers and Depositors denote borrowers and depositors from commercial banks per 1,000 adults, respectively. Standard errors are in parentheses. ***and ** indicate significant at 1% and 5% level, respectively.

Table 6: Endogeneity Test

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Output | 1.033*** | 1.054*** | 0.936*** | 0.926*** | 1.009*** | 1.111*** |
| | (0.054) | (0.055) | (0.057) | (0.053) | (0.136) | (0.056) |
| Output × Branches I | −0.056*** | | | | | |
| | (0.012) | | | | | |
| Output × Branches II | | −0.065*** | | | | |
| | | (0.011) | | | | |
| Output × ATMs I | | | −0.026*** | | | |
| | | | (0.009) | | | |
| Output × ATMs II | | | | −0.019*** | | |
| | | | | (0.007) | | |
| Output × Borrowers | | | | | −0.019 | |
| | | | | | (0.012) | |
| Output × Depositors | | | | | | −0.039*** |
| | | | | | | (0.008) |
| Constant | −0.233* | −0.339*** | −0.860*** | −0.899*** | −0.278 | −0.114 |
| | (0.131) | (0.131) | (0.094) | (0.084) | (0.305) | (0.247) |
| Observations | 795 | 932 | 715 | 845 | 255 | 370 |

† Same as Table 1 except that we include the lagged term of dependent variable (consumption) in the model to allow for dynamics. In addition, we also permit the explanatory variables (output and the interaction terms) to be endogenous. Estimation of the resulting dynamic panel data model is carried out by the generalized method of moments (GMM). Standard errors (p-values) are in parentheses (brackets). ***and ** indicate significant at 1% and 5% level, respectively.

Table 7: Robust Regression Results

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Output | 0.994*** | 1.025*** | 0.881*** | 0.947*** | 1.138*** | 1.196*** |
| | (0.030) | (0.029) | (0.030) | (0.028) | (0.044) | (0.048) |
| Output × Branches I | −0.059*** | | | | | |
| | (0.007) | | | | | |
| Output × Branches II | | −0.068*** | | | | |
| | | (0.006) | | | | |
| Output × ATMs I | | | −0.044*** | | | |
| | | | (0.005) | | | |
| Output × ATMs II | | | | −0.047*** | | |
| | | | | (0.004) | | |
| Output × Borrowers | | | | | −0.027*** | |
| | | | | | (0.004) | |
| Output × Depositors | | | | | | −0.022*** |
| | | | | | | (0.004) |
| Constant | −0.233* | −0.339*** | −0.860*** | −0.899*** | −0.278 | −0.114 |
| | (0.131) | (0.131) | (0.094) | (0.084) | (0.305) | (0.247) |
| Observations | 908 | 1055 | 829 | 954 | 492 | 437 |

† Same as Table 1 except that estimation results are obtained using Hamilton's (1991) robust approach. Standard errors are in parentheses. *** and ** indicate significant at 1% and 5% level, respectively.

Table 8: Fixed-Effect Quantile Regression Results

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Output | 1.078*** | 1.100*** | 1.032*** | 1.032*** | 1.007*** | 1.147*** |
| | (0.003) | (0.029) | (0.003) | (0.003) | (0.006) | (0.008) |
| Output × Branches I | −0.033*** | | | | | |
| | (0.001) | | | | | |
| Output × Branches II | | −0.047*** | | | | |
| | | (0.002) | | | | |
| Output × ATMs I | | | −0.019*** | | | |
| | | | (0.001) | | | |
| Output × ATMs II | | | | −0.016*** | | |
| | | | | (0.001) | | |
| Output × Borrowers | | | | | −0.023*** | |
| | | | | | (0.002) | |
| Output × Depositors | | | | | | −0.037*** |
| | | | | | | (0.001) |
| Constant | −0.334* | −0.334*** | −0.329*** | −0.337*** | −0.546 | −0.577*** |
| | (0.002) | (0.003) | (0.003) | (0.003) | (0.004) | (0.003) |
| Observations | 915 | 1058 | 835 | 972 | 495 | 441 |

† Same as Table 1 except that estimation results are obtained using Canay's (2011) fixedeffect quantile regression approach. Standard errors are in parentheses. *** and ** indicate significant at 1% and 5% level, respectively.