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IMBALANCES***

Anders C. Johansson  
Stockholm School of Economics

Xun Wang  
Stockholm School of Economics

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Postal address: P.O. Box 6501, S-113 83 Stockholm, Sweden.  
Office address: Hölländargatan 30 Telephone: +46 8 736 93 60 Telefax: +46 8 31 30 17  
Internet: <http://www.hhs.se/cerc>

# Financial Repression and Structural Imbalances

Anders C. Johansson

Stockholm School of Economics

Xun Wang\*

Stockholm School of Economics

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\*Corresponding author, Stockholm School of Economics, P.O. Box 6501, SE-113 83 Stockholm, Sweden. Phone: +46-8-736 9267. Fax: +46-8-31 30 17. Email: xun.wang@hhs.se. Johansson acknowledges financial support from the Bank of Sweden Tercentenary Foundation (RJ) and the Swedish Foundation for International Cooperation in Research and Higher Education (STINT). We would like to thank Yiping Huang, Kunyu Tao, Bijun Wang, Weihua Dang and other participants at a workshop seminar at Peking University for their insightful comments on this paper. We have also benefited from comments by participants at the China Annual Economic Conference.

## Abstract

This paper analyzes the relationship between financial repression and structural change. We present a simple theoretical model of structural transformation in which the impact of financial repression on unbalanced growth is studied. Governments may choose to repress the financial sector to allow for the development of the industry sector while inhibiting growth in the domestic service sector. When investigating the predictions of our model using data for a panel of countries, we find that financial repression have a significant negative effect on structural transformation. In countries with higher levels of financial repression, the industry sector is developed rapidly while the service sector is held back. The results are robust to different country sample compositions, alternative measures of sectoral structure, and different measures of financial repression. The analysis suggests that financial repression is an important driver of structural imbalances, especially in countries with heavy state intervention and where the government strongly favors industrial expansion. Our findings have policy implications for governments that are experiencing rapid economic transformation and that are using financial repression to achieve a long-run industrial output growth.

*JEL Classification:* G18; O16; O40; L52

*Keywords:* Financial repression; Structural change; Structural transformation; Economic development

# 1 Introduction

Structural transformation constitutes one of the main stylized facts of economic development (Kuznets, 1957, 1973). All developed economies follow a similar pattern of structural change, with a falling production and employment share in the agricultural sector, an initially rising but eventually falling share in the industry sector, and a rising share in the service sector (Pandit and Casette 1989; Mokyr 1993; Acemoglu 2009). This unbalanced growth pattern across sectors is not consistent with the so-called “Kaldor facts” and not supported by traditional balanced-growth models.

Exploring the determinants of structural transformation improves our understanding of economic development in general and imbalances during different phases of development in particular. Previous research has focused on preference-related (demand side) and technology-related (supply side) reasons for why employment and production shift from agriculture to manufacturing, and then from manufacturing to services as an economy becomes richer. At the heart of the demand side is the argument that the process of structural change can be driven by the so-called Engel’s Law, which states that the share of increments of a household’s income spent on agricultural products is declining (e.g. Kongsamut et al., 2001; Foellmi and Zweimüller, 2008). Kongsamut et al. (2001) extend Engel’s law by positing that as a household becomes richer, it not only spends less on food but also desires to spend more on services. The main gist of the supply-side argument is instead that different sectors grow at different rates owing to different rates of technological progress or factor proportion difference across sectors combined with capital deepening.

While there are a number of demand- and supply-side based analyses in the literature, few studies pay attention to the impact of institutional distortions on the process of structure change. Among a plethora of potential institutional distortions, we argue that distortions in the financial system, in particular financial repression, may be one of the most important impediments to structural balances and balanced growth. Governments in financially repressed economies tend to allocate limited financial assets and provide financial facilities to the often

preferred industry sector by credit rationing and low real interest rates.<sup>1</sup> Especially developing countries are eager to attract foreign exchange and foreign direct investment (FDI), which are seen as important ingredients in the quest for new technology and development in general. It is thus common for governments to implement preferable policies and allocate resources to support the development of the domestic industry sector. With an increased openness and economic takeoff, the industry sector, as a primary tradable sector, expands faster than the domestic service sector. The service sector will thus be held back due to distorting financial policies.

In this paper, we examine the impact of financial repression on the process of structural change. We present a model of non-balanced growth based on differences in technological progress in which financial repression is introduced. To provide support for the main propositions of the model, we then collect data for a panel of countries and carry out an empirical analysis. As suggested by our theoretical model, the empirical results show that financial repression retards the process of sectoral transformation. In particular, financial repression is positively associated with a repressed service sector relative to the industry sector. The results hold up to various robustness checks, indicating that the theoretical model is supported by the data. We also find that certain policies of financial repression have a significant impact on economic structure. In particular, barriers to entry in the banking sector, weakness of banking sector supervision, capital controls, and the repression of security markets inhibit the process of structural transformation.

The rest of the paper is organized as follows: In Section 2, we first review the existing related literature and briefly discuss the central hypothesis. In Section 3, we present a model of financial repression and unbalanced structural change. Section 4 describes the data and the framework of the empirical analysis. In Section 5, we explore the empirical relationship

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<sup>1</sup>Regardless of whether a government chooses a development strategy based on export-led growth or import substitution, it will allocate limited financial resources to develop the domestic industry sector. There is often a special initial focus on the manufacturing, a typical tradable sector. Another potential reason behind a government choice to give the domestic industry sector preferential treatment is that of national security.

between financial repression and structural transformation. We examine possible mechanisms behind the effects of financial repression on sectoral transformation in Section 6. Finally, Section 7 concludes the paper.

## 2 Literature Review

Models of economic growth are typically consistent with the so-called “Kaldor facts”, which state that the growth rate, the capital-output ratio and the share of capital income in GDP should be constant in relative terms (Kaldor 1961; Denison 1974; Homer and Sylla 1991; Barro and Sala-i-Martin 2004). However, unbalanced structural growth as witnessed in many countries around the world is not justified by balanced growth models. A recent strand in the growth literature develops models of economic development to explore the process of structural change. This strand can be divided into two categories, where the first focuses on explanations based on preferences (demand side), while the second focuses on technology (supply side).<sup>2</sup> The literature that focuses on the demand side typically posits non-homothetic preferences consistent with Engel’s law to explain nonbalanced growth. In this setting, the marginal rate of substitution between different goods changes as an economy grows, a process that leads to a pattern of uneven growth among sectors (Kuznets 1957, 1973; Chenery, 1960; Kongsamut et al., 2001). The focus on the supply side and technology was first proposed by Baumol (1967). Here, the emphasis is instead on differences in productivity growth among sectors. Baumol et al. (1985) provide new evidence of differences in technological progress among sectors to verify unbalanced growth. Ngai and Pissarides (2006) construct a multisector growth to illustrate structural change. Acemoglu and Guerrieri (2008) present a model of unbalanced growth based on differences in factor proportions and capital deepening. Also, Buera and Kaboski (2011) develop a model that focuses on explaining sector reallocations, scale technologies (especially in manufacturing),

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<sup>2</sup>See Buera and Kaboski (2009) for a discussion and analysis on the two different explanations for structural change.

and movements in production between home and abroad.

Few, if any, studies have as of yet focused on the impact of financial distortions on the process of structural change. The term ‘financial repression’ was initially coined by McKinnon (1973), who defined it as government financial policies that strictly regulate interest rates, set high reserve requirement on bank deposits, and mandatorily allocate resources in the economy. Such repressive policies, more commonly seen in developing countries, are believed to impede financial deepening and lower the overall efficiency of the financial system. As a consequence, they are believed to hold back economic growth (McKinnon, 1973; Shaw, 1973).

The negative impact of financial repression on efficiency and growth is commonly accepted and constitutes the theme of a large body of literature. Pagano (1993) shows that financial policies such as interest rate controls and reserve requirements decrease the amount of financial resources available for financial intermediation. Roubini and Sala-i-Martin (1992) present theoretical and empirical analyses of the negative relationship between repressive financial policies and long-term growth. King and Levine (1993) develop an endogenous growth model to illustrate that financial sector distortions reduce growth by lowering the rate of innovation.

While there are numerous theoretical and empirical studies on the negative link between financial repression and economic growth, other studies cast doubts on the significance of this relationship. Stiglitz (2000) attributes the increasing frequency of financial crises around the world during the past decades to financial liberalization in the developing world. Developing countries may thus be better able to manage their money supply and financial stability as well as improve the Pareto efficiency under policies based on financial restraints due to the problem of imperfect information (Stiglitz and Weiss 1981; Stiglitz 1994; Hellmann et, al., 1997, 2000). The significance of the negative influence of financial repression on economic growth is thus not to be taken for granted. Levine (2005) provides a thorough review of the topic of financial development and its relation to economic growth.

The discussion above suggests that the question of whether financial repression inhibits or facilitates economic growth needs to be determined empirically. The net impact is likely dependent on a combination of two potential mechanisms – the negative effect suggested by McKinnon (1973) and Shaw (1973) and the positive effect highlighted by Stiglitz (1994) and Hellmann et al (1997, 2000). The final outcome of an empirical analysis on the relationship between financial repression and economic development might be ambiguous and will depend on whether one these effects will dominate the other. Huang and Wang (2011) examine the impact of financial repression on economic growth during China’s reform period. Their empirical results confirm that, on average, repressive policies has helped economic growth in China, probably due to a prudent and gradual approach to liberalization. However, their results also indicate that the impact turned from positive in the 1980s and 1990s to negative in the 2000s, suggesting rising efficiency losses during the last decade. Their findings thus show that the effect of financial repression on economic development is most likely dependent on the general level of development and the institutional setting in the country in question.

This paper examines the impact of financial repression on economic structural change. Our central hypothesis is that repressive financial policies retard the process of structural change by facilitating the development of the industry sector while inhibiting that of the service sector. Governments in financially repressed economies tend to allocate more financial resources to the development of the industry sector due to certain development strategies, which, in turn, holds back the movement of other resources (labor, land, etc) from the industry sector to the service sector.

### **3 A Model of Financial Repression and Unbalanced Structural Expansion**

In this section, we develop a simple model to illustrate the impact of financial repression on the process of sectoral change. The economy is divided into two sectors. Following

Baumol (1967, 1985), we specify sector 1 as the industry sector which is stagnant with no technological progress and sector 2 as the service sector which is progressive at growth rate  $r$ . The respective outputs in sector 1,  $Y_{1t}$  and sector two  $Y_{2t}$  at time  $t$  are defined as:

$$Y_{1t} = aL_{1t}^\gamma, \tag{1}$$

$$Y_{2t} = \phi(b)L_{2t}^\gamma e^{rt}, \tag{2}$$

where  $0 < \gamma < 1$ . There is no labor growth, and the total labor supply  $L$  is normalized to 1. Therefore,  $L_{1t} + L_{2t} = 1, \forall t$ . With financial repression, the government can develop its preferred industry sector by restraining the development of the service sector. Similar to Roubini and Sala-i-Martin (1992), we set  $b$  as the measure of financial repression.  $\phi(\cdot)$  is then decreasing in  $b$  and set in the interval of  $[0, 1]$ . Keeping everything else unchanged, a higher level of financial repression thus results in a lower level of output in the service sector.<sup>3</sup> The following two first-order conditions determine the labor demands in the two sectors:

$$a\gamma L_{1t}^{\gamma-1} = w_{1t}, \tag{3}$$

$$\gamma\phi(b)e^{rt}L_{2t}^{\gamma-1} = w_{2t}. \tag{4}$$

We assume that labor can transfer freely between the two sectors. Free mobility guarantees equal wages in the two sectors in equilibrium for every period. The wage and labor allocation in time  $t$  are then given by:

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<sup>3</sup>For simplicity, we do not introduce capital into the model. Including capital will not change the basic result of our model. One way to implicitly take capital into account in this framework is by acknowledging that financial repression inhibits the development of the service sector through a distorted allocation of limited amounts of capital. The industry sector will thus expand due to a preferential support of financial sector to that sector.

$$L_{1t} = \frac{1}{1 + X_t}, \quad (5)$$

$$L_{2t} = \frac{X_t}{1 + X_t}, \quad (6)$$

$$W_t = a\gamma(1 + X_t)^{1-\gamma}, \quad (7)$$

where  $X_t = [a^{-1}\phi(b)e^{rt}]^{\frac{1}{1-\gamma}}$ .  $X_t$  is growing with  $t$  and decreasing with financial repression  $b$ . Having introduced the main features of the model, we are now ready to derive some fundamental properties of the system.

*Proposition 1:* With technology progress, wages rise but with a declining rate; the progressive service sector attracts an increasing amount of resources, i.e. labor. However, financial repression will hinder the transfer of resources from industry to services. Hence, the government can exert financial repression to protect the preferred but stagnant industry sector. The output ratio and the labor ratio in the two sectors thus remain the same:

$$\frac{Y_2}{Y_1} = \frac{L_2}{L_1} = [a^{-1}\phi(b)e^{rt}]^{\frac{1}{1-\gamma}}. \quad (8)$$

*Proposition 2:* With technology progress, the output and employment shares of the stagnant sector shrink; at the same time, the progressive sector expands in both its output share and employment share. At the same time, financial repression will suppress the development of the progressive sector.

What would happen if the government attempts to maintain the relative outputs of the two sectors? Then we would have

$$\frac{Y_2}{Y_1} = \frac{L_2}{L_1} = [a^{-1}\phi(b)e^{rt}]^{\frac{1}{1-\gamma}} = K, \quad (9)$$

where  $K$  is a constant. To achieve this, the government can set the level of financial

repression according to the technological improvement in the progressive sector:

$$\phi(b) = ae^{-rt}K^{\frac{1}{1-\gamma}}. \quad (10)$$

The government may thus set financial repression at a certain level to hinder economic resources moving from the stagnant to the progressive sector. Financial repression may therefore be used by the government to protect and develop the stagnant but preferred industry sector.

## 4 Data and Econometric Model

The theoretical model introduced in the previous section belongs to the category of supply side explanations for unbalanced growth. To examine the impact of financial repression on structural change while avoiding the problem of omitted important variables, we introduce preference-related (demand side) variables into the empirical analysis and let them function as control variables. We start with the main equation in our theoretical model and specify the econometric model as:

$$STRUCTURE_{it} = \beta_0 + \beta_1 FREP_{it} + \beta_2 X_{it} + \alpha_i + \lambda_t + \xi_{it}, \quad (11)$$

where  $STRUCTURE_{it}$  is the economic structure of country  $i$  at year  $t$  proxied by the ratio of service share of GDP to industry sector of GDP.  $FREP_{it}$  is the level of financial repression of country  $i$  at year  $t$ .  $X_{it}$  is a series of preference-related control variables that motivate economic transformation, including real income level,  $LNGDP_{it}$ , measured as the logarithmic form of real GDP per capita; trade openness,  $TRADE_{it}$ , measured as the ratio of total trade to GDP; and age dependency,  $AGE_{it}$ , defined as the ratio of dependents, i.e. people younger than 15 and older than 64, to the total population. Following Engel's law, real income will increase the demand for services. On the other hand, trade openness

is expected to raise the demand for industry products (tradable goods) relative to service product. Finally, an increase in the ratio of children and elder people to the total population is expected to result in higher demand for services such as education, medical care and insurance.

We collect data for 58 countries from 1981 to 2005. The data of industry output share, service output share, the ratio of industry sector share to service sector share, industry sector employment share, service sector employment share, the ratio of service sector employment share to industry sector employment share, real GDP per capita, trade and age dependency are from the World Bank's World Development Index (WDI) dataset. The measure of financial repression is from IMF and is found in Abiad et al. (2008). Deposit interest rates and consumer prices are from the IMF Financial Statistics (IFS) data base. Table 1 presents the descriptive statistics of each variable.

[TABLE 1 HERE]

The database of financial repression provides a multifaceted measure of reform, covering seven aspects of financial sector policies: credit controls; interest rate controls; entry barriers; state ownership in the banking sector; prudential regulations and supervision of the banking sector; bank regulations; privatization; capital account restrictions and securities markets policy. Each country is given a final score along each dimension on a graded scale from 0 to 3, with 0 corresponding to the highest degree of repression and 3 indicating full liberalization (Abiad et al., 2008). For our analysis, we define each variable as 1 minus the the given score divided by 3. This allows us to normalize each variable into the interval of 0 to 1. The larger the number is, the higher the degree of repression.

Simple correlations between variables provide initial visual support for our hypothesis. Previous research on structural transformation indicate that with economic growth, development of the industry sector follows an initially rising but eventually falling share while the service sector increase over time. These patterns of structural change are shown in Figures 1, 2, and 3. Figure 1 depicts the relationship between the sectoral output ratio and GDP

per capita, which indicates a U shaped effect of income level on sectoral transformation. The inverse U shape relationship of industry share and the increasing relationship of service share are seen in Figures 1 and 2, respectively.

[FIGURES 1, 2, AND 3 HERE]

The theoretical model suggests that financial repression hinders the process of sectoral transformation by inhibiting the movement of resources from the industry sector to the service sector. The negative relationship between financial repression and the sector output ratio is seen in Figure 4. Figure 5 shows the negative relationship between financial repression and the sector employment ratio.

[FIGURES 4 AND 5 HERE]

The theoretical model predicts that a higher degree of financial repression will hold down the service sector and protect the development of the industry sector. The linear correlation in Figure 6 shows the negative relationship between financial repression and the service sector's share of output. Figure 7 depicts the correlation between financial repression and industry share. No clear correlation is seen between these two variables. Since simple linear correlation is often insufficient to identify existing relationships between variables, the next section introduces the results of a comprehensive regression analysis that also take several several robustness issues into account.

[FIGURES 6 AND 7 HERE]

## **5 Financial Repression and Structural Transformation: Empirical Evidence**

The theoretical model presented in the previous section suggests that there is an important relation between financial repression and economic transformation. In particular,

financial underdevelopment and financial repression will hold back the process of economic sectoral transformation. When the government resorts to policies of financial repression, the development of the service sector will be repressed relative to that of the industry sector. In this section, we present empirical evidence on the relationship between financial repression and economic structural change. We begin with a baseline model and then continue with several robustness checks to justify the theoretical implications and preliminary results of the baseline model.

### ***5.1 Baseline Model***

We start our estimation with a baseline model. Here, we examine the relationship between financial repression and sectoral structure by first including financial repression index as an independent variable. We then add the demand-side control variables: log real GDP per capita, trade openness and the age-dependency ratio. Taking into account the typical U-shaped effect of economic development on sectoral transformation, we also introduce the square term of log real GDP per capita. Table 2 reports the results using three different estimation procedures: pooling OLS, fixed effects and random effects. The first three columns list the results with the financial repression index as the only explanatory variable. The next three columns present the results when controlling for potential demand-side effects. In columns 5 and 6, we also control for time-specific effects.<sup>4</sup>

The significantly negative sign of financial repression indicate that a higher level of repression in the financial system leads to relatively a lower service share compared to industry sector share of a country's GDP. A higher level of financial repression enables the government to allocate more financial resources (bank loans, easy access to stock and bond markets, etc) to the preferred industry sector. This means that the development of the service sector will be restrained. After controlling for other variables, the effect of financial repression declines

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<sup>4</sup>To control for potential endogeneity, we also run additional regressions with the setup in columns 5 and 6 in Table 3. In these estimations, we include lagged values of the explanatory variables. The results remain qualitatively the same.

somewhat when we use a fixed-effect and random-effect approach. However, the effect still remains significant at the 1% level. Hausman tests suggest that the random effect estimation is more efficient than the fixed effect model. Again, the significance of the effect of financial repression is not dependent on the estimation procedure.

The coefficient for LN-SQUARE is significant and positive while the coefficient for LNGDP is significant and negative, indicating a U-shaped effect of income level on sectoral transformation. The demand for output from the industry sector initially increases faster than that of the service sector, a process that is later reversed, showing that the service sector becomes increasingly important as the economy develops. As expected, trade openness has a significantly negative effect on sector transformation, showing that a higher degree of openness increases the demand for industry products, i.e. tradable goods, more than services. Finally, a larger share of children and older people leads to a significant increase in the demand for services relative to that of industrial products.

[TABLE 2 HERE]

Proposition 1 tells us that, in the absence of financial repression, the labor share of the service sector will increase while the labor share of the industry sector will decrease and the service sector's share of output will rise and the industry's share will decline. However, the model shows that financial repression will hinder this process. Next, we examine this theoretical prediction by using the industry output share and the service output share as dependent variables.

Table 3 presents the impact of financial repression on the industry output and service output shares of total GDP. The first three columns list the results estimations using the industry output share as the dependent variable. The estimated coefficient of financial repression is positively significant, suggesting that an increase in the level of financial repression will raise the industry output share through a reallocation of resources. The relationship between income and the industry output share follows an inverse U-shape, as indicated by the negative sign of LNGDP-SQUARE and the positive sign of LNGDP. The development

of trade will increase the demand for industry products. Also, the age dependency ratio has a negative effect on the industry output ratio. Again, Hausman tests show that the random effect estimation is more suitable. Here, we therefore focus on the results from the random effect regression. Keeping other things unchanged, a 1% increase in the level of financial repression leads to a 0.026% increase in the industry output share. Furthermore, a 1% increase in TRADE will result in a 0.067% increase in the industry output share and a 1% increase in AGE will lead to a 0.119% decline in the industry output share.

The last three columns in Table 3 present the estimation results when using the service sector output share of total GDP as the dependent variable.<sup>5</sup> Financial repression and trade openness are significantly negatively related to the service sector's output share, while income level and the age dependency ratio are positively related to the service sector's output share. The random effect regression results presented in column 5 show that, keeping other things unchanged, a 1% increase in FREP leads to a 0.056% decrease in service output share, which supports our theory stating that financial repression has a negative impact on the development of the service sector. A 1% increase in TRADE results in a 0.029% decrease in the service output share, a 1% increase in AGE leads to a 0.101% increase in the service output share, and a 1% increase in log real GDP per capita results in a 0.042% increase in the service output share, thus supporting Engel's law.

[TABLE 3 HERE]

## ***5.2 Robustness Checks***

The negative impact of financial repression on structural transformation predicted by our theoretical model is supported by the estimation results from the baseline regression model. However, it can be argued that the estimation results are sensitive to groups of countries that are included in the study as well as the measurement of the dependent variable. Therefore, we

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<sup>5</sup>We initially included the square term of LNGDP as in the other regressions. However, the square term is insignificant in all the three models and we therefore drop it and report in the final estimation.

also examine the robustness of the baseline results by using different countries and different dependent variable to measure the sectoral structure.

We first divide our data into two groups by real GDP per capita: developing countries and developed countries.<sup>6</sup> Table 4 reports the random effect estimation results. During the period of 1981-2005, the impact of financial repression in developing countries is significantly negative (-0.506). The effect of financial repression is smaller for developed countries (-0.178) and it is only significant at the 10% level. When examining the more recent period (1991-2005), financial repression significantly inhibits the process of sectoral structure change in both developing and developed countries. For developed countries, the effect of financial repression on structural change is much larger during the later period, indicating that the effect of repressive financial policies has become more pronounced during a period marked by widespread financial reforms. Overall, these results indicate that the effect of financial repression on structural change is to some extent dependent on the level of development and time period, but that the effect remains significant and negative over the different subsamples and subperiods..

[TABLE 4 HERE]

According to the literature on financial repression, economies that are financially repressed are characterized by artificially low real interest rates. Governments in financially repressed economies tend to control deposit and lending rates below the level of the inflation rates, which will reduce the financing cost for the specific industry. While real interest rates contributes to the total score of financial repression index used in the earlier section, it is combined with six other repressive policies in that index. Therefore, as an additional robustness check, we follow earlier studies and use the real interest rate as a proxy for financial repression (e.g. Agarwala, 1983; Gelb, 1988; Easterly, 1990; Roubini and Sala-i-Martin, 1992).

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<sup>6</sup>High-income OECD and non-OECD countries are grouped as developed countries while countries with higher-middle, lower-middle, and low income are grouped as developing countries.

Table 5 presents the results using the real interest rate as a measure of financial repression. Note that the lower the real interest rate is, the higher the level of financial repression. The dependent variable of the first two columns is the ratio of service share of GDP over the industry share of GDP. Columns 3 and 4 and columns 5 and 6 use industry share of GDP and service share of GDP as dependent variable, respectively. Again, we see that financial repression (here marked by a lower real interest rate) significantly distorts the process of structural change by holding back the development of the service sector. Supportive of earlier findings, people demand more service products as real income increases, trade openness raises the demand for industry products relatively to the service, and an increased demand for services is a result of an aging population. Specifically, holding other things constant, a 1% decrease (i.e. a higher level of financial repression) leads to a 0.045% increase in industry share and a 0.076% decrease in the service share. A 1% increase in real income per capita results in 0.044% increase in the service sector. A 1% increase in trade openness reduces the share of the service sector by 0.024% and increases the share of the industry sector by 0.059%. And, a 1% increase in the age-dependency ratio will result in a 0.110% increase in the service sector share and a 0.143% decrease in the industry sector share.

[TABLE 5 HERE]

As the literature and our model suggest, the employment ratio in different sectors is an alternative measure of industrial structure. According to the model, employment in the service sector will decline if the government exerts a higher level of financial repression. Table 6 presents the estimation results using the employment share as the dependent variable. The dependent variable in the first two columns is the ratio of service employment share over industry employment share. The dependent variable of column 3 and column 4 is the industry employment share and the dependent variable in the last two columns is the service employment share. Again, we run the regression using fixed effect and random effect specifications, controlling for country-specific and year-specific effects. Hausman tests show

that a random effect specification is suitable for all three regressions.<sup>7</sup>

[TABLE 6 HERE]

We again focus on the results of the random effect estimation. Looking at column 2, financial repression has a significant negative effect on the ratio of employment in the service sector over employment in the industry sector. Furthermore, columns 4 and 6 show that a 1% increase in financial repression results in a 0.017% increase in the share of employment in the industry sector and a 0.075% decrease in the share of employment in the service sector.

The employment share of the industry sector will first rise and then decline with the increase of real income per capita. The opposite holds for the service sector, which will first experience a decline followed by an increase as real income per capita grows. Trade openness will increase labor demand in the industry sector. Also, a higher ratio of children and elderly to the total population will reduce the relative demand for industry products. More specifically, a 1% increase in financial repression will lead to a 0.017% increase in the industry employment share and a 0.075% decline in the service employment share. A 1% increase of trade openness leads to 0.030% increase in the industry employment share and an insignificant decrease in the service employment share. Finally, a 1% increase in age-dependency ratio results in a 0.251% decline in the industry employment share and a 0.093% increase in the service employment share.

## **6 Possible Mechanisms behind the Impact of Financial Repression**

The empirical results so far suggest that financial repression impedes the process of structural transformation and results in internal structural imbalances, at least partly by

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<sup>7</sup>We once more control for potential endogeneity by running additional regressions with the setup in columns 1 and 2 in Table 6. When we include lagged values of the explanatory variables, the results remain qualitatively the same.

inhibiting the movement of financial resources from the industry sector to service sector. It has been argued that central planners devise and adopt repressive financial policies, such as interest rate restrictions, credit allocation regulations, capital account controls, and barriers to entry in the banking sector in order to achieve faster economic growth (Lin et al., 1995; Huang, 2010). Under incomplete information, such policies can be Pareto improving through a direct allocation of limited financial resources and resolution of the problems of market failure and financial instability.

During early phases of economic growth, with the raise of trade and openness, the demand for industry products expands, which results in a rapid development of the industry sector. Compared to the service sector, the development of the industry sector has a much more direct effect on economic growth. Governments in financially repressed economies thus have an incentive to allocate more financial resources to the industry sector, especially the manufacturing sector. Over time, however, repressive financial policies inflict increasing costs in terms of distorted capital allocation and efficiency losses (Li, 2001). Financial repression holds down the development of the service sector, especially the banking sector, the development of which will improve the efficiency of the economy by allocating resources to the most promising projects. Although it is possible to achieve a high level of economic growth with such policies, financial repression will result in serious structural imbalances such as a disproportionate investment share of GDP and a large current account surplus as well as structural risks (e.g. Huang, 2010).

An examination of individual policy variables might shed light on the impact of specific policies and thus result in important policy implications. We therefore conduct new regressions focusing on the different policies of financial repression introduced in Section 4.. The seven individual variables are: credit controls, interest rate controls, share of state-owned banks of the total banking sector, barriers to entry into the financial sector, inefficiency in the supervision of the banking sector, capital controls, and repression of the security market. Given the multicollinearity problems among these variables (Abiad et al., 2008), we do not

include all seven variables in the same equation. Instead, we run separate regressions in which each of the policy variables are included as explanatory variables.

Table 7 presents the estimation results from the estimation with random effects. The coefficients for credit controls and interest-rate controls are positive but insignificant. Also, the share of state-owned bank is negative but insignificant. These three variables thus have little impact on the sectoral structure. The coefficients of barriers of entry into the banking sector, inefficiency of bank supervision, capital control and repression of security market are significant and negative. Thus, keeping other things unchanged, barriers to entry in the banking sector, weakness of banking sector supervision, capital controls, and the repression of security markets significantly impede the process of structural transformation by repressing the service sector.

[TABLE 7 HERE]

## 7 Concluding Remarks

We propose a model in which differences in productivity across sectors lead to an unbalanced pattern of economic growth. The allocation of productive factors across sectors and the impact financial repression on the process of structural change are analyzed. We show that financial repression hinders structural transformation by holding back the movement of resources from the stagnant sector to the progressive sector. The service sector is usually underdeveloped in financially repressed economies. Our empirical estimation results support this hypothesis and various robustness checks justify that financial repression protects the industry sector while restraining growth in the service sector.

Previous research on unbalanced growth emphasizes two main approaches for explaining the process of structural transformation. One focuses on preferences, stating that households desire to spend more on services as their income increases. The other focuses on technology, stating that the unbalanced growth pattern across sectors results from different levels of

productivity or factor proportion differences across sectors combined with capital deepening. We argue that the impact of institutional distortions on structural change, while not found in the existing literature on structural imbalances, is an important element in the process of structural change. We explore the impact of distortions in the financial system in the form of repressive financial policies on the process of structural transformation. Our empirical results show that financial repression has a significant and opposite influence on the development of industry and service sectors, respectively. With financial repression, the industry sector is usually overdeveloped while the service sector is repressed, thus distorting the process of structural change.

Our paper also provides important policy implications for governments in financially repressed economies. To reduce structural risk and imbalances and improve economic efficiency, prudent reforms in the financial system are motivated. In particular, our empirical results indicate that these reforms should focus on capital account liberalization, the development of securities markets, and a reduction of barriers to entry in the domestic banking sector.

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TABLE 1. Summary Statistics of Main Variables (1981-2005)

Variables	Observations	Mean	Std. Dev.	Minimum	Maximum
Output Ratio	1450	1.943	0.617	0.477	4.086
Industry Output Ratio	1450	0.308	0.080	0.072	0.613
Service Output Ratio	1450	0.556	0.107	0.218	0.772
Financial Repression Index	1450	0.432	0.289	0	1
Log Real GDP Per Capita	1450	8.052	1.618	4.625	10.612
Trade Openness	1450	0.643	0.490	0.108	4.310
Age Dependency Ratio	1450	0.659	0.177	0.371	1.130
Credit Control Index	1450	0.375	0.358	0	1
Interest Rate Control	1450	0.302	0.398	0	1
Entry Barriers	1450	0.352	0.369	0	1
Bank Supervision	1450	0.686	0.336	0	1
Privatization	1450	0.532	0.397	0	1
Capital Control	1450	0.370	0.359	0	1
Security Markets	1450	0.405	0.361	0	1
Real Interest Rate	1075	0.004	0.096	-1.278	0.387
Employment Ratio	750	2.245	0.633	0.728	4.451
Industry Employment Ratio	750	0.258	0.058	0.082	0.388
Service Employment Ratio	750	0.564	0.145	0.134	0.778

TABLE 2. Financial Repression and Relative Sectoral Output Share

Dependent Variable	1	2	3	4	5	6
STRUCTURE	OLS	FE	RE	OLS	FE	RE
CONSTANT	2.224*** (0.028)	2.242*** (0.019)	2.241*** (0.070)	6.461*** (0.385)	8.303*** (0.878)	7.686*** (0.793)
FREP	-0.649*** (0.053)	-0.692*** (0.040)	-0.691*** (0.039)	-0.898*** (0.064)	-0.245*** (0.085)	-0.328*** (0.082)
LNGDP				-1.426*** (0.092)	-1.750*** (0.207)	-1.712*** (0.186)
LNGDP-SQUARE				0.098*** (0.006)	0.106*** (0.013)	0.112*** (0.012)
TRADE				-0.058** (0.028)	-0.404*** (0.068)	-0.329*** (0.060)
AGE				1.625*** (0.125)	1.022*** (0.184)	0.980*** (0.169)
Country-Specific Effect	NO	YES	YES	NO	YES	YES
Year-Specific Effect	NO	NO	NO	NO	YES	YES
Hausman Test	—	0.811		—	0.852	
Observations	1450	1450	1450	1450	1450	1450
$R^2$	0.093	0.093	0.224	0.324	0.117	0.251

Note: Reported numbers for the Hausman test are  $P$ -values. Numbers in parentheses are standard errors. \*\*\*, \*\* and \* indicate 1%, 5% and 10% level of significance, respectively.

TABLE 3. Financial Repression and Output Share of Industry and Service Sectors

Dependent Variable	Industry Output Share			Service Output Share		
	OLS	FE	RE	OLS	FE	RE
CONSTANT	-0.578*** (0.048)	-0.666*** (0.091)	-0.639*** (0.086)	0.131*** (0.023)	0.315*** (0.049)	0.158*** (0.037)
FREP	0.078*** (0.008)	0.026*** (0.009)	0.035*** (0.009)	-0.139*** (0.008)	-0.045*** (0.009)	-0.056*** (0.009)
LNGDP	0.247*** (0.011)	0.238*** (0.021)	0.242*** (0.020)	0.047*** (0.002)	0.021*** (0.006)	0.042*** (0.004)
LNGDP-SQUARE	-0.015*** (0.001)	-0.013*** (0.001)	-0.014*** (0.001)	—	—	—
TRADE	0.007** (0.003)	0.067*** (0.007)	0.059*** (0.007)	-0.002 (0.003)	-0.035*** (0.008)	-0.029*** (0.007)
AGE	-0.181*** (0.015)	-0.119*** (0.019)	-0.108*** (0.018)	0.156*** (0.015)	0.113*** (0.020)	0.101*** (0.019)
Country-Specific Effect	NO	YES	YES	NO	YES	YES
Year-Specific Effect	NO	YES	YES	NO	YES	YES
Hausman Test	—	0.564		—	0.481	
Observations	1450	1450	1450	1450	1450	1450
$R^2$	0.384	0.251	0.295	0.675	0.416	0.614

Note: Reported numbers for the Hausman test are  $P$ -values. Numbers in parentheses are standard errors. \*\*\*, \*\* and \* indicate 1%, 5% and 10% level of significance, respectively.

TABLE 4. Robustness Check: Different Income Groups

Dependent Variable	Random Effect Estimation				
	All Countries	Developing Countries		Developed Countries	
Sample Period	1981-2005	1981-2005	1991-2005	1981-2005	1991-2005
CONSTANT	7.686*** (0.793)	7.507*** (1.261)	14.387*** (1.911)	-10.175*** (4.883)	-34.348*** (10.564)
FREP	-0.328*** (0.082)	-0.506*** (0.073)	-0.333*** (0.126)	-0.178* (0.102)	-0.708*** (0.215)
LNGDP	-1.712*** (0.186)	-1.322*** (0.368)	-3.216*** (0.554)	3.274*** (0.997)	7.756*** (2.156)
LNGDP-SQUARE	0.112*** (0.012)	0.080*** (0.027)	0.215*** (0.039)	-0.214*** (0.053)	-0.414*** (0.111)
TRADE	-0.329*** (0.060)	-0.174** (0.080)	-0.399*** (0.105)	-0.311*** (0.078)	-0.338*** (0.093)
AGE	0.980*** (0.169)	-0.105 (0.046)	-0.565* (0.292)	0.934** (0.475)	1.389* (0.721)
Country-Specific Effect	YES	YES	YES	YES	YES
Year-Specific Effect	YES	NO	NO	YES	YES
Hausman Test	0.852	0.816	0.151	0.899	1.000
Observations	1450	900	540	550	330
$R^2$	0.251	0.186	0.124	0.149	0.190

Note: Reported numbers for the Hausman test are  $P$ -values. Numbers in parentheses are standard errors. \*\*\*, \*\* and \* indicate 1%, 5% and 10% level of significance, respectively.

TABLE 5. Robustness Check: Real Interest Rate as a Measure of Financial Repression

Dependent Variable	Output Share		Industry Share		Service Share	
	FE	RE	FE	RE	FE	RE
CONSTANT	5.266*** (0.828)	5.082*** (0.788)	-0.348*** (0.044)	-0.333*** (0.083)	0.239*** (0.047)	0.102*** (0.038)
FREP1	0.447*** (0.096)	0.467*** (0.096)	-0.043*** (0.010)	-0.045*** (0.010)	0.073*** (0.011)	0.076*** (0.011)
LNGDP	-1.145*** (0.195)	-1.185*** (0.184)	0.174*** (0.020)	0.180*** (0.019)	0.026*** (0.006)	0.044*** (0.004)
LNGDP-SQUARE	0.074*** (0.012)	0.082*** (0.011)	-0.009*** (0.001)	-0.011*** (0.001)	—	—
TRADE	-0.388*** (0.066)	-0.348*** (0.068)	0.063*** (0.007)	0.059*** (0.006)	-0.024*** (0.007)	-0.024*** (0.007)
AGE	1.325*** (0.179)	1.271*** (0.319)	-0.152*** (0.019)	-0.143*** (0.018)	0.121*** (0.019)	0.110*** (0.018)
Country-Specific Effect	YES	YES	YES	YES	YES	YES
Year-Specific Effect	YES	YES	YES	YES	YES	YES
Hausman Test	0.988		0.598		0.319	
Observations	1075	1075	1075	1075	1075	1075
$R^2$	0.151	0.254	0.211	0.249	0.450	0.634

Note: Reported numbers for the Hausman test are  $P$ -values. Numbers in parentheses are standard errors. \*\*\*, \*\* and \* indicate 1%, 5% and 10% level of significance, respectively.

TABLE 6. Robustness Check: Employment Share as a Measure of Structural Change

Dependent Variable	Employment Share		Industry Share		Service Share	
	FE	RE	FE	RE	FE	RE
CONSTANT	7.516*** (1.234)	6.915*** (1.200)	-0.402*** (0.089)	-0.415*** (0.087)	0.726*** (0.108)	0.614*** (0.108)
FREP	-0.134 (0.108)	-0.352*** (0.103)	0.013* (0.007)	0.017** (0.007)	-0.060*** (0.009)	-0.075*** (0.009)
LNGDP	-1.364*** (0.278)	-1.543*** (0.259)	0.176*** (0.020)	0.183*** (0.016)	-0.074*** (0.024)	-0.072*** (0.023)
LNGDP-SQUARE	0.068*** (0.018)	0.097*** (0.015)	-0.009*** (0.001)	-0.009*** (0.001)	0.007*** (0.002)	0.008*** (0.001)
TRADE	-0.003*** (0.001)	-0.214*** (0.068)	0.037*** (0.006)	0.030*** (0.006)	-0.007 (0.007)	-0.004 (0.006)
AGE	1.786*** (0.333)	1.791*** (0.319)	-0.259*** (0.024)	-0.251*** (0.023)	0.117*** (0.029)	0.093*** (0.001)
Country-Specific Effect	YES	YES	YES	YES	YES	YES
Year-Specific Effect	YES	YES	YES	YES	YES	YES
Hausman Test	0.177		1.000		0.441	
Observations	750	750	750	750	750	750
$R^2$	0.225	0.283	0.493	0.496	0.729	0.782

Note: Reported numbers for the Hausman test are  $P$ -values. Numbers in parentheses are standard errors. \*\*\*, \*\* and \* indicate 1%, 5% and 10% level of significance, respectively.

TABLE 7. Impact of Individual Repressive Policies

Dependent Variable	Random Effect Estimation						
	1	2	3	4	5	6	7
STRUCTURE							
CONSTANT	6.930*** (0.788)	6.956*** (0.785)	7.145*** (0.788)	7.311*** (0.778)	7.070*** (0.778)	7.378*** (0.773)	7.799*** (0.794)
REPPOLICY	0.067 (0.038)	0.063 (0.035)	-0.027 (0.038)	-0.195*** (0.041)	-0.133*** (0.051)	-0.266*** (0.039)	-0.236*** (0.054)
LNGDP	-1.549*** (0.187)	-1.554*** (0.186)	-1.609*** (0.185)	-1.627*** (0.183)	-1.537*** (0.185)	-1.658*** (0.182)	-1.750*** (0.186)
LNGDP-SQUARE	0.102*** (0.012)	0.102*** (0.011)	0.106*** (0.012)	0.107*** (0.011)	0.100*** (0.012)	0.108*** (0.011)	0.114*** (0.012)
TRADE	-0.369*** (0.060)	-0.359*** (0.059)	-0.356*** (0.060)	-0.347*** (0.059)	-0.341*** (0.059)	-0.320*** (0.059)	-0.346*** (0.059)
AGE	0.833*** (0.168)	0.756*** (0.176)	0.846*** (0.168)	0.880*** (0.166)	0.817*** (0.167)	1.051*** (0.168)	0.983*** (0.169)
Country-Specific Effect	YES	YES	YES	YES	YES	YES	YES
Year-Specific Effect	YES	YES	YES	YES	YES	YES	YES
Hausman Test	0.275	0.353	0.437	0.758	0.716	0.769	0.247
Observations	1450	1450	1450	1450	1450	1450	1450
$R^2$	0.200	0.201	0.216	0.235	0.216	0.246	0.236

Note: The repressive policy instruments (*REPPOLICY*) in each of the seven regressions are: (1) credit controls; (2) interest rate controls; (3) share of state-owned banks of the total banking sector; (4) barriers to entry into the financial sector; (5) inefficiency in the supervision of the banking sector; (6) capital controls; and (7) repression of the security market. Reported numbers for the Hausman test are  $P$ -values. Numbers in parentheses are standard errors. \*\*\*, \*\* and \* indicate 1%, 5% and 10% level of significance, respectively.

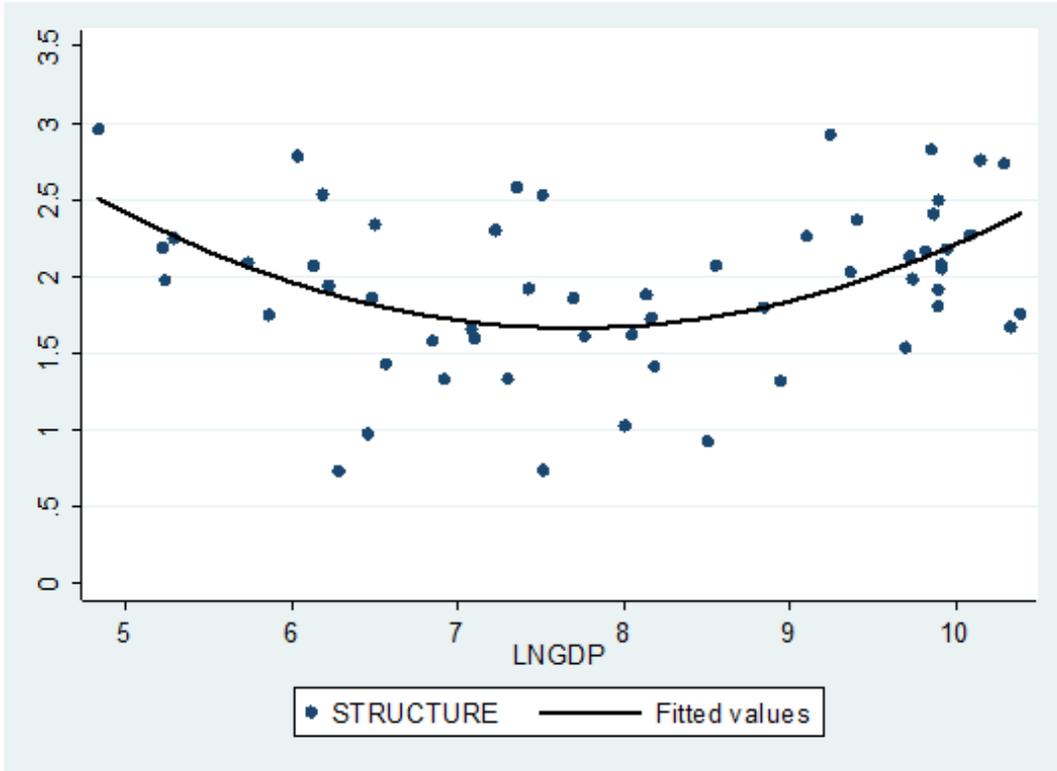


FIGURE 1. The Output Ratio and Real GDP per capita

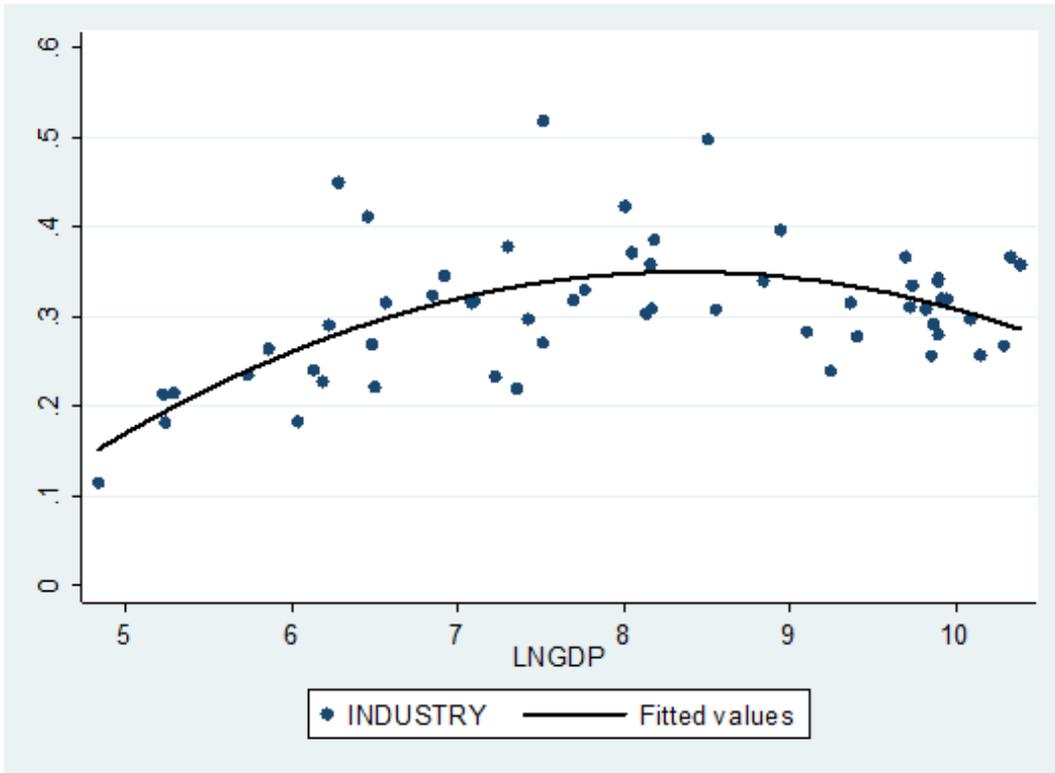


FIGURE 2. The Industry Output Ratio and Real GDP Per Capita

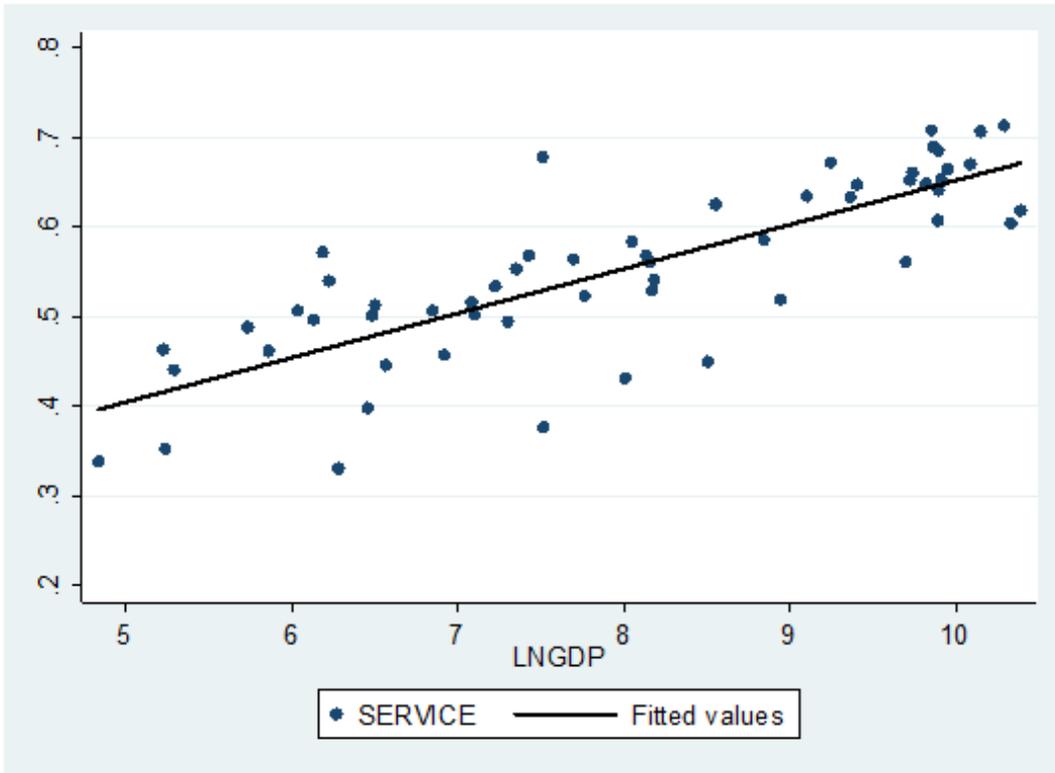


FIGURE 3. The Service Output Ratio and Real GDP Per Capita

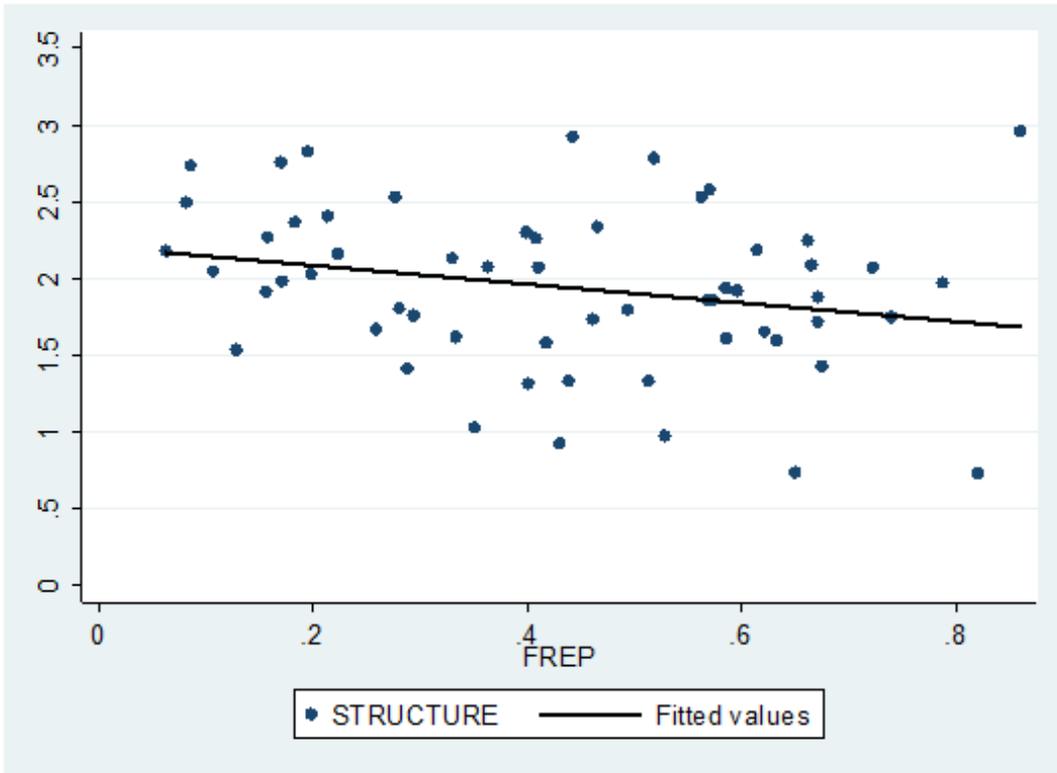


FIGURE 4. The Output Ratio and Financial Repression

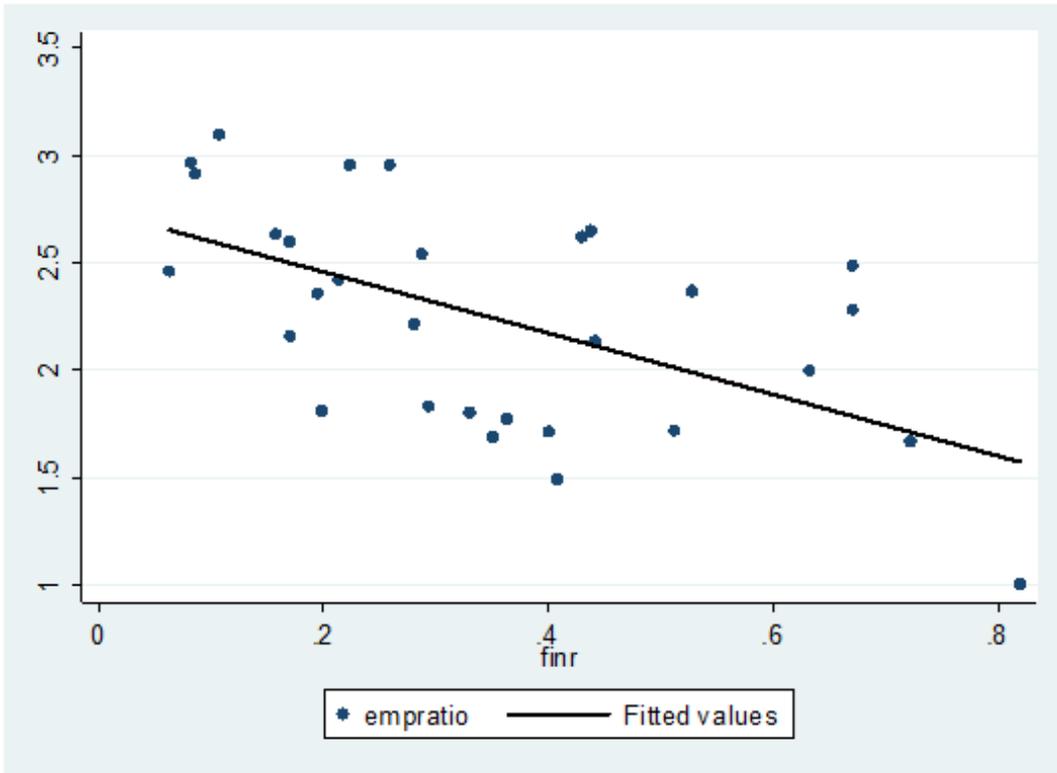


FIGURE 5. The Employment Ratio and Financial Repression

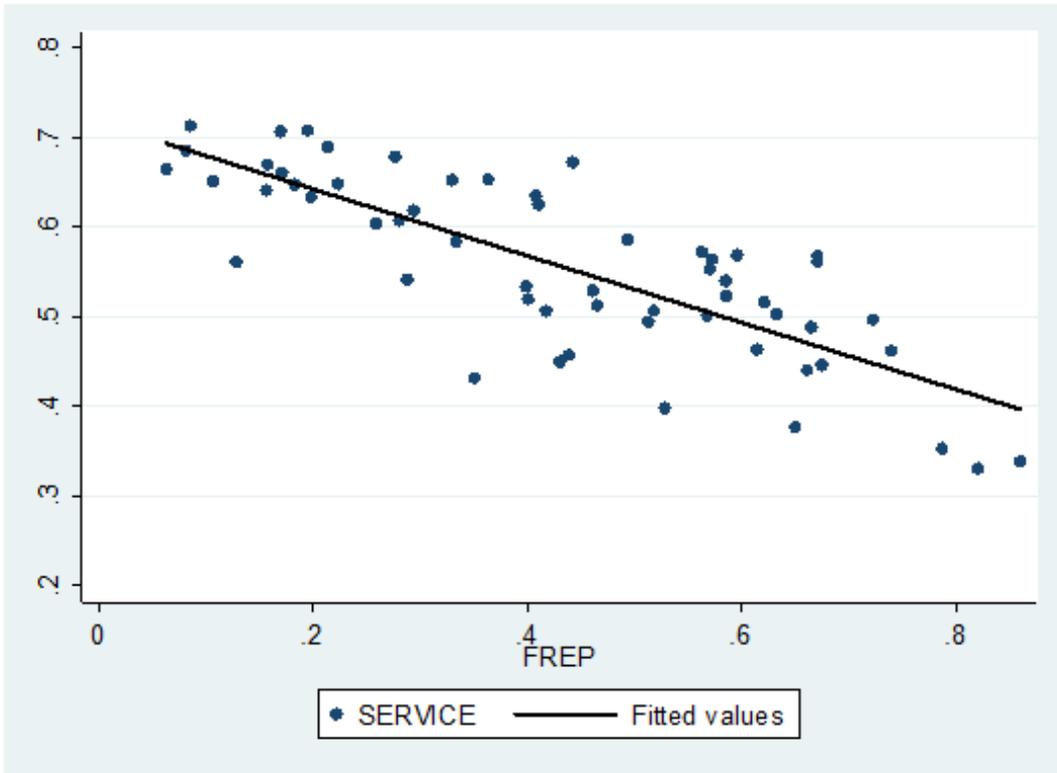


FIGURE 6. The Service Output Ratio and Financial Repression

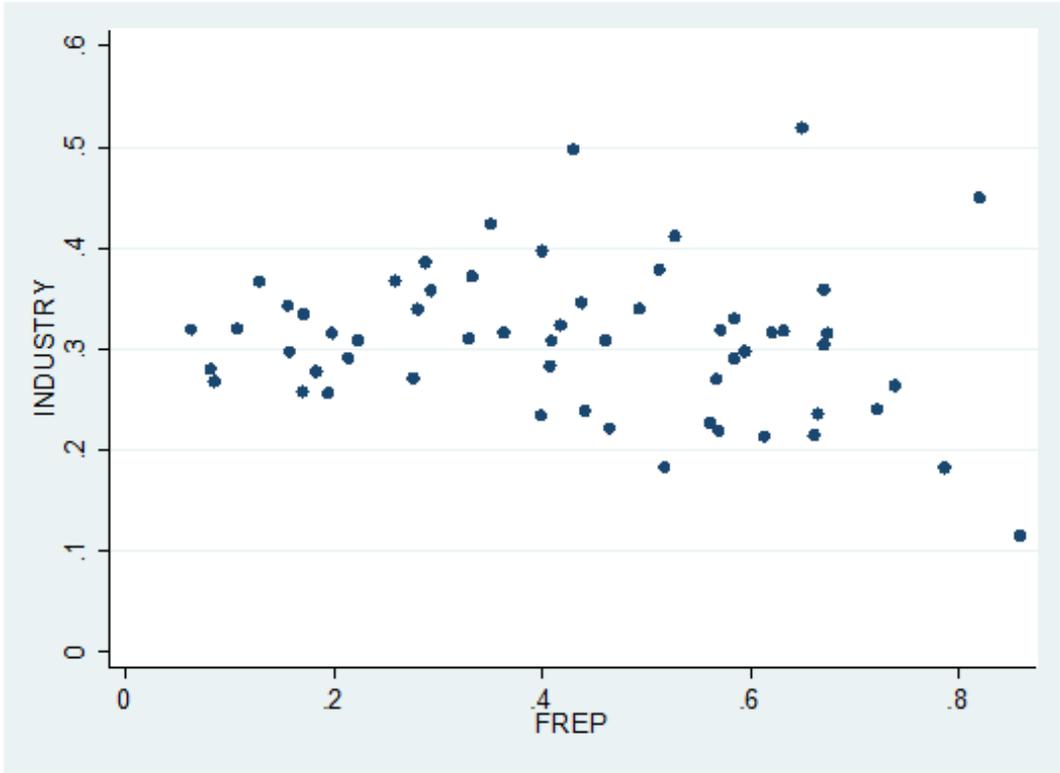


FIGURE 7. The Industry Output Ratio and Financial Repression