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Does the financial sector occupy too much human capital?

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Abstract This thesis studies if and when the size of the financial sectors starts to have a negative effect on economic growth. The size of the financial sector is modelled using employment in the sector. The study uses a panel data model with the EU15 countries covering the years from 1970 to 2007 (1985 to 2005 for some regressions). The results show that the positive contribution to growth of labour and skill allocated in the financial sector is diminishing, and that the diminishing aspect primarily acts through productivity. The effect does, however, not become negative.

Keywords: Economic growth, Financial sector, Financial sector size, Human capital.

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1. Introduction

As early as in 1984, Tobin (p.14) argued: "…we are throwing more and more of our resources, including the cream of our youth, into financial activities remote from the production of goods and services, into activities that generate high private rewards disproportionate to their social productivity." Considering the recent expansion of the financial sector and its increasing use of skilled labour it begs the question of whether the concerns of Tobin have come true.

This thesis examines the relationship between the size of the financial sector and economic growth. The results show that the employment share allocated to the financial sector has a positive but diminishing relationship with the economic growth going through productivity. A similar diminishing relationship is found between the allocation of skill to the financial sector and growth.

The idea that the financial sector provides services that facilitate both productivity and growth is old, and has among others been presented by Schumpeter (1911). This was later backed up by the pioneering work of Goldsmith (1969) showing a positive correlation between the size of the financial sector and economic growth. A correlation does, however, not mean that finance causes growth, i.e. the relationship could very well go the opposite direction. Evidence of finance being an indicator of economic growth was first shown by King and Levine (1993), and strong indications of causality going from financial sector size to economic growth have thereafter been found (e.g. Beck, Levine, and Loayza, 2000, Levine, Loayza, and Beck, 2000, Rajan and Zingales, 1998). While the issue of causality has not been fully resolved, the general consensus in modern economics is that the financial sector indeed contributes to economic growth (Levine, 2005).

Following the sub-prime mortgage crisis of 2007 and the ensuing financial crisis, representatives of financial authorities have, nonetheless, expressed their concern regarding the current size of the financial sector (e.g. Turner, 2010, Smaghi, 2010). Several studies indicate that these concerns are not unfounded as it seems as if the financial sector might very well become inefficiently large in comparison to other sectors (Arcand, Berkes, and Panizza, 2015, Law and Singh, 2014, Samargandi, Firdmuc, and Ghosh, 2015). These studies, however, measure the size of the financial sector by its services of intermediation, which severely limits their ability to explain what lies behind the apparent oversize of finance that they find.

Potential brain drain from productive and innovative sectors has been laid forward as a potential cause (e.g. Kneer, 2013a, Kneer 2013b, Cecchetti and Kharoubi, 2012). The idea is that the financial sector serves as a force of attraction of skilled labour by having a wage premium. Skilled labour can potentially be better at allocating credit and thereby increase economic growth when allocated to the financial sector. This drain of talent away from innovative sectors is nonetheless thought to eventually decrease growth as less technological advancements will be made.

This thesis attempts to combine two ideas of the potentially oversized financial sector with its possible cause, the misallocation of talent. It does this by using variables that one would normally

assume to be connected to brain drain of labour with testing techniques used by previous research that have found the financial sector to be too large in many countries. The variables that are used are the share of employment, a measurement of the skill usage of finance relative to other sectors, the share of value added, and a measurement of the skill premium of finance. Both the share of employment and the share of value added directly measure the size of the financial sector. The share of employment does, however, also directly measure brain drain, while the share of value added focuses on the attraction force of finance through income. Similarly a measurement of the skill intensity captures the relative usage of talent of the financial sector, while the skill premium measures how strong the attraction force is that finance exerts on talent. The oversized financial sector phenomena is captured by regressing both a linear term capturing the positive effect of finance, and a quadratic term that captures the negative aspects of finance. This approach allows for the identification of a threshold where the financial sector occupies too much labour and skill in the economy. The variables are then regressed on GDP per capita growth and productivity growth. Using two explained variables to capture the effect of the financial sector on the macro-level means that the thesis sheds some light on through what channels this effect goes through.

It is found that the financial sector can become too big and stop contributing to economic growth. This is observed when regressing the labour allocation to finance on productivity growth. In the same way the skill intensity of the financial sector can stop affecting productivity growth when it expands too much. These effects are not found to be as strong when regressing the two variables on GDP per capita growth. This indicates that the brain drain mainly affects innovative sectors which has also been found in previous research (Kneer 2013a, 2013b). The two measurements of the attraction force of the financial sector do not show the similar effect on the aggregate. This could mean that the income of the financial sector does not affect the economy, neither positively nor negatively, and that the drain of personnel to the financial sector is poorly represented by changes in financial sector income.

The thesis is structured as follows. Chapter 2 presents the hypotheses and reviews the literature regarding both the positive and negative effects of finance on the aggregate level. Thereafter chapter 3 firstly gives the methodology that was used to define the variables and econometric models of the thesis. Secondly the sources of data are briefly discussed. Thirdly the results of the thesis are presented and various causes and implications of the result are analysed. Furthermore, the robustness of the results are considered. Lastly chapter 4 contains a short summary and an overall conclusion of the results.

2. The Relationship between Finance and Growth

The financial sector provides several important functions in the economy that increases economic growth (see e.g. Levine, 2005 for a review of literature). Through intermediation the financial sector

improves the allocation of funds in the economy thus improving the allocation of capital and fostering innovation. The financial sector also provides a monitoring function, which increases the incentives for sound management. Additionally, the financial sector can reduce the risk of investors and direct funds to high risk high reward investments by enabling diversification. There are, however, indications that the benefit of the financial sector might have decreasing returns to scale (Rioja and Valev 2004a), or that its impact could even hurt the long term economic growth if allowed to grow too large (e.g. Arcand et al. 2015, Law and Singh, 2014).

Several factors may lie behind the potential negative impact of finance. Firstly, the contribution of the financial sector depends greatly on whether credit goes to enterprises or households (Angeles, 2015, Beck, Büyükkarabacak, Rioja, and Valev, 2012). Secondly, the financial sector is often associated with financial volatility (Gennaioli, Shleifer, and Vishny, 2012, Shleifer and Vishny, 2010) which often has macroeconomic consequences. Thirdly, the financial sector might also drain talent from innovative sectors, consequently reducing the rate of innovations (e.g. Bolton, Santos, and Scheinkman 2011, Kneer 2013b). Since innovation often is considered the engine of long-run growth, this last downside of the financial sector is of particular interest.

This thesis will attempt to combine the idea that the financial sector might become too large, with the ideas of misallocation of talent away from innovative industries. Subsequently the hypothesis is the following:

> Hypothesis: *The financial sector exerts a positive impact on economic growth. The marginal effect of a greater financial sector is, however, negative and the effect of the financial sector turns negative after a given threshold.*

2.1 Positive Effects

The financial sector has a positive impact on economic growth through intermediation. The financial sector does this, by acting as a market place were funds can be reallocated, and by compensating for informational asymmetries between economic actors (Ramakrishnan and Thakor, 1986). Thereby the financial sector improves the allocation of funds in the economy and indirectly increases economic growth. At the same time economic growth increases individual wealth, allowing more persons to be able to afford financial intermediation. Thus, creating a reciprocal relationship between the financial sector and economic growth (Greenwood and Jovanovic 1990). In evidence of the growth facilitating effect of intermediation, credit depth has shown to improve economic growth (Beck and Levine, 2004, Levine et al., 2000). Moreover, financial intermediation can facilitate growth by boosting technological innovation. This is achieved by financial intermediaries evaluating entrepreneurial projects and identifying the most promising ones. Funding of these projects is then mobilised by the financial sector (Blackburn and Hung, 1998, King and Levine, 1993). This has also been reflected empirically, as financial liberalisation has a positive impact on innovation for industries with high

external finance dependence (Moshirian, Tian, Zhang, and Zhang, 2015). Furthermore, credit depth seems to have a positive impact on innovative activity on the aggregate level (Ang, 2011).

Regarding the other two functions: the monitoring of innovative activities by financial intermediaries create incentives for improved effort for entrepreneurs. As the monitoring improves, the financial intermediaries are also able to offer better products to entrepreneurs, thus encouraging innovation (De la Fuente and Marin, 1996). Moreover, the financial sector allows the possibility of risk management through diversification. Since investors are often risk adverse, risk management enables for more investments in high risk, high return project. In addition to improving the utility of investors, the shift towards the high risk, high return projects may facilitates growth, provided that these projects are more growth enhancing than low risk projects (Acemogulo and Zilibotti, 1997, Saint-Paul, 1991). The positive relationship between stock market development and economic growth has among others been reported by Beck and Levine (2004).

It is clear that the financial sector provides a significant contribution to the long-term economic growth. This effect is transmitted through the two channels, capital accumulation and productivity growth (Andersson, Burzynska, and Opper, forthcoming, Bonfiglioli, 2008). Which of these channels that dominate, moreover, seems to depend on the level of income of the country, since the financial intermediation mainly facilitates growth in low income countries through the accumulation of capital and through productivity growth in high income countries (Rioja and Valev, 2004b).

The contribution of finance, nevertheless, does not necessarily need to remain constant as the financial sector grows larger. In fact there are indications that the growth contribution of the financial sector has diminishing returns to scale (Masten, Coricelli, and Masten, 2008, Rioja and Valev 2004a).

2.2 Negative Effects

Taking it even further several authors have shown that the financial sector might start to have a negative impact when the credit depth becomes too large in proportion to GDP (Arcand et al. 2015, Law and Singh, 2014, Samargandi et al. 2015). It is thus apparent that something within the financial sector affects the aggregate in a negative way, and that this effect grows stronger the larger the financial sector becomes.

A considerable amount of literature associates large financial sectors with economic instability and crises. For instance, when certain improbable risks are ignored by both investors and intermediaries, securities carrying these risks tend to be over-issued. When the risk is later discovered, investors try to exchange these securities for asset with less risk. Since the wealth of intermediaries usually is smaller than that of the investors, prices of the securities with risks drop when the investors rush to sell their risk bearing assets. Naturally this causes financial instability (Gennaioli et al., 2012). Furthermore, non-traditional banking activities such as securitisation, while profitable for banks in the short run, tend to increase the risk of bank crashes (DeYoung and Torna, 2013, Shleifer and Vishny, 2010). Financial crises are, as is well known certainly not good for the banking sector, and they do

also often spill over to real sectors. Moreover, since the ramifications of a financial crash naturally get bigger when the size of the financial sector increases, it is possible that the growth mitigating aspects of finance are in fact the instability caused by it. The negative effect of too much finance is, however, robust even in times of financial stability (Arcand et al., 2015). A more plausible connection is therefore, as argued by de la Torre, Ize, and Schmukler, (2012, p. 25) "… the marginal benefits of financial development may at some point become smaller than the marginal cost of maintaining financial stability." Beck, Degryse, and Kneer (2014), however, find that credit depth, while having little effect on economic growth, in fact mitigates economic volatility, putting the idea that the volatility of the financial sector lie behind the apparent possibility of an over-sized financial sector to doubt.

By separating between credit allocated to firms and credit allocated to household, one might be able to find an alternative explanation to the non-monotonous relationship between credit depth and economic growth. Credit to enterprises and entrepreneurial activities is a productive form of credit. Household credit is also generally thought of as welfare enhancing since it allows for the redistribution of income over an individual's lifetime. Lack of self-control can, however, cause household credit to decrease individual welfare and negatively affect the household savings rate (Laibson, 1997). Therefore, the allocation of credit between households and enterprises could very well matter for the long-term economic growth. Studies separating between firm credit and household credit have found that firm credit as expected facilitates growth. Household credit on the other hand has no effect on the long-term economic growth (Beck et al., 2012), and instead increases the risk of financial crises (Angeles, 2015). The risk enhancing effect of household credit is certainly concerning, and relating it to the findings of Beck et al. (2014) suggests that household credit could very well reduce the risk mitigating effect of enterprise credit. Moreover, the growth in the size of the financial sector over the past 100 years was in the US to a great extent driven by increases in household credit (Greenwood and Scharfstein, 2013). A growing importance of household credit and the seemingly non-existent effect of household credit on economic growth, could help explain the decreasing returns to scale of credit depth. The lack of a negative effect of household credit on economic growth does, nevertheless, make it unlikely that household credit lies behind the u-shaped relationship found between credit depth and economic growth.

The non-monotonous relationship between finance and growth could also be a result of misallocation of labour. Misallocation builds upon the ideas of Baumol (1990) and Murphy, Shleifer, and Vishny (1991) stating that the social benefit of entrepreneurship at large depend on whichever of productive and unproductive activities are the most rewarding. Many financial activities are certainly not unproductive, there is, nonetheless, literature suggesting that the number of financiers may become inefficiently large due to excessive rents earned by the sector (e.g. Bolton et al., 2011, Philippon, 2010, Würgler, 2009). To put it differently, a drain of labour and talent to the financial sector can occur if the income of the financial sector becomes too large relative to the income of other industries.

As a matter of fact, the relative wage of the financial sector has increased over the years for several developed countries (Boustanifar, Grant, and Reshef, 2014, Philippon and Reshef, 2013). In addition, a study of French engineers showed that finance has a premium to talent that has increased since the 1980s (Célérier and Vallée, 2011).

Sporadic evidence suggests that the wage premium found in finance indeed has worked as a force of attraction for labour. For example, careers in finance have become increasingly chosen by Harvard graduates (Goldin and Katz, 2008). Moreover, high wages in the financial sector have had a documented impact on cross-border migration of skilled workers to finance (Boustanifar et al. 2014). Furthermore, the skill intensity of the financial sector has increased in relation to the rest of the economy (Philippon and Reshef, 2013), indicating that the financial sector might attract skilled labour much needed in the innovative sectors. The increase of skill intensity of finance can, nonetheless, also be explained by the increased use of information and communication technology (Philippon and Reshnef, 2013), and by financial deregulation (Boustanifar et al. 2014, Philippon and Reshef, 2013).

Skilled labour in the financial sector is, however, not necessarily bad. Skilled intermediaries can possibly better screen firms and entrepreneurs, thereby the allocation of credit should improve when the skill intensity in finance rises. Similarly, skilled financiers would most likely be better at monitoring enterprises and entrepreneurs than financiers with low levels of skill. Nevertheless, the allocation of credit can only be improved up to a certain point, where the allocation is already optimal. Likewise, the monitoring activities can in theory reach a ceiling, since firms will be fully monitored. At these points, a greater skill intensity in finance will not be socially beneficial. Furthermore, the financial sector engages in activities with limited effect on economic growth such as asset trading, which by definition is a zero-sum game. These activities would also have use of skilled labour. It is therefore likely that skilled labour in the financial sector promotes growth but that this effect becomes smaller and smaller. Eventually, the drain of skill from innovative sectors will overcome these positive effects, making the marginal social benefit of skilled labour in finance, negative.

Recent studies have shown that financial deregulation causes R&D intensive industries to grow slower (Cecchetti and Kharroubi, 2015, Kneer, 2013a, Kneer, 2013b), and that the average wage of finance negatively affects the accumulation of patents (Ang, 2011). This indicates that innovative sectors are indeed hurt by skill increases in finance. The total effect on the aggregate level is, however, at large unexplored. Cecchetti and Kharroubi (2013) show that productivity has a non-monotonous relationship with the employment share of the financial sector. To the author's knowledge this is the only contribution, which calls for more research on the aggregate level, in order to be able to draw conclusions regarding the effect of misallocation of labour on the general equilibrium, which might appear as the financial sector grows too large.

3. Empirical Analysis

An oversized financial sector is more likely to be found in developed countries than in developing countries. For this reason the study is limited to the EU15 countries. Since, finance predominantly affects the growth of developed countries through productivity, both the GDP per capita growth and the Total Factor Productivity (TFP) growth are used as dependent variables. Furthermore, in total four proxy variables were used to measure the effect of the financial sector on growth, namely, the share of employment, the share of value added, the relative skill intensity, and the relative high skilled wage. These variables in addition to a number of control variables, were used in OLS panel regressions to test the hypothesis of the thesis. Variables for financial sector size were obtained from the EU KLEMS database. The time frame used, starts in 1970 and ends in 2007 for the variables the share of employment and the share of value added. For the relative skill intensity and the relative high skilled wage, the shorter time frame of 1985 to 2005 is used as a result of data limitations.

3.1. The Model

The two dependent variables, GDP per capita growth and TFP growth makes it possible to see where the size of the financial sector potentially has the strongest negative impact. A stronger effect on productivity, for instance, serves as an indication that the financial sector might drain human capital from innovative sectors.

The first explaining variable used in this thesis is the share of employment of the financial sector. Albeit a crude measurement of the allocation of talent, it serves as a measurement of the size of the financial sector by its usage of labour relative to the rest of the economy. The negative aspect of using the share of employed in the financial sector, is that it does not account for changes in the skill composition of workers in the financial sector. The share of employment in the financial sector is defined for every country as the total number of persons engaged in the financial sector divided by the total number of persons engaged in the whole economy.

The second explaining variable is the share of value added of the financial sector of the value added of the whole economy. This variable can be interpreted as the total income of the financial sector, i.e. the wage paid to workers plus the compensation to capital. It then represents the attractiveness of the financial sector for workers. Nonetheless, just as the case of the share of employed, this measurement is crude, as the compensation to capital is included. The share of value added is defined as the value added of the financial sector divided by the value added of the aggregate.

Two more precise measurements of potential brain drain that are used in this thesis are, the skill intensity of the financial sector relative to the rest of the economy, and the relative high skilled wage of the financial sector. The disadvantage of using these two are the limited data available. The relative skill intensity measures rather accurately how much human capital is being used by the financial sector. A brain drain effect or a misallocation of talent should thus be observable through this variable.

The relative skill intensity is defined as the share of hours in the financial sector worked by high skilled labour, subtracted by the share of hours in the rest of economy worked by high skilled labour. The relative high skilled wage measures more precisely the force of attraction that the financial sector exerts on the high skilled population, than the variable share of value added. This enables us to pinpoint the effect of the financial sector's wages on the whole economy. The relative high skilled wage is defined as the ratio between the average wage of high skilled labour in the financial sector and the average wage of the high skilled labour in the rest of the economy. By using in total four ways to measure brain drain, both directly by looking at the labour allocation, and indirectly through the income of the sector, a robustness check is performed automatically.

There is strong evidence that the financial sector contributes positively to economic growth. When creating an econometric model for the effects of brain drain, this positive contribution must be taken into consideration. Therefore a linear term must be present in the regression. The negative effects of the financial sector due to the brain drain, should, nevertheless, eventually dominate the positive contribution, when the financial sector becomes too large. It is therefore likely that a quadratic term is the best way to model the misallocation of labour.

To capture the evolution of the financial sector over time, in addition to differences between countries, panel data is used. Furthermore, since it is likely that the interaction between the dependent variable and the independent variables (e.g. that growth causes financial expansion in addition to financial expansion causing growth), all independent variables must be lagged one period. As follows, two models are used:

$$Y_{i,t} = \alpha_i + \beta_t + \gamma F_{i,t-1} + \delta (F_{i,t-1})^2 + \zeta X_{i,t-1} + \varepsilon_{i,t} \ , \qquad (1)$$

where $Y_{i,t}$ is the GDP per capita growth for country i during time period t, α_i and β_t are country specific and time specific effects respectively, $F_{i,t-1}$ is the independent financial sector variable tested, $X_{i,t-1}$ is a vector of control variables, and $\varepsilon_{i,t}$ is the two-way error component.

$$A_{i,t} = \alpha_i + \beta_t + \gamma F_{i,t-1} + \delta (F_{i,t-1})^2 + \zeta X_{i,t-1} + \varepsilon_{i,t}, \qquad (2)$$

where the independent variable $A_{i,t}$ stands for TFP growth.

Regarding the vector of control variables, human capital, inflation, openness to trade, and government consumption are used. The usage of these variables and their relevance for growth is supported by, Acemogulo, (1996), Barro, (1991), Lucas, (1988), and Romer, (1990) in the case of human capital, by Fischer (1993), Eggoh and Khan (2014), and Bruno and Easterly (1998) when it comes to inflation, by Krugman (1979), Frankel and Romer (1999), Barro and Sala-i-Martin (1997), Lucas, (1973), Jarrett and Selody (1982), Papapetrou, (2003) regarding the openness to trade, and finally by Barro , (1990, 1991) and Fölster and Henrekson, (2001), for the inclusion of government consumption. Human capital and the openness to trade are expected to be positively correlated with the dependent variables, while a negative correlation is expected to be found with inflation and government consumption.

Both models were regressed using three year averages for all variables to capture long term effects, but still retain a large number of observations. Especially, when the relative skill intensity and the relative high skilled wage are regressed and thus the shorter time span of 1985 to 2005 is used, five year averages gives too few observations. As can be seen in the models above all explaining variables were lagged one time period, in order to avoid simultaneity. In addition, all series were tested for the presence of a unit-root with the Levin-Lee-Shu test[1], and all non-stationary time series were made stationary by taking the first difference. Moreover, the Durbin-Watson statistic was used to detect autocorrelation and the White test was used to detect heteroscedasticity. When autocorrelation, heteroscedasticity, or both were detected, robust standard errors were used. Lastly the Jarque-Bera statistic was used to test for normality.

Note, however, that the usage of panel regressions and the inclusion of a quadratic term is not an absolute test for a u-shaped relationship. In fact the quadratic term could very well pick up a concave relationship of decreasing returns of scale. For that reason, the number of observations that exceeded the point of maximum with one standard deviation of the variable in question is used to differentiate between decreasing returns to scale and a u-shaped relationship.

3.2. Data

The EU KLEMS database was used for the explaining variables (see O'Mahony and Timmer (2009) for details on the methods used in creating the database). Data for the dependent variables: GDP per capita growth and TFP growth, were taken from the World Bank's World Development Indicators (WDI) and Penn World Tables respectively. Regarding sources for the control variables, WDI was used for openness to trade, and government consumption, data on inflation was found through IMF, and Barro and Lee (2010) provided data on the average years of education.

Table 1 contains descriptive statistics for all variables used in the regressions. Table 2 presents an overview of the variables for the allocation of skill and labour as well as income of the financial sector. As can be seen in table 2, Luxembourg has by far the highest value in the share of employed by the financial sector, and the share of value added in 2007. Furthermore, no countries have negative values of relative skill intensity in 2005, which means that the financial sector employed more skilled labour in terms of hours relative to the rest of the economy. Similarly, only Greece has in 2005 a lower average high skilled wage than the rest of the economy, as shown by their value of relative high skilled wage below one. This raises the concern that too much skilled human capital is allocated to the financial sector, and that the attraction force of finance for high skilled labour is too high.

[1] See the appendix for the test and test results

Table 1

Descriptive statistics

	Mean	Median	Maximum	Minimum	Standard Deviation	Observations
GDP per capita growth	2.3005	2.3934	8.6871	-3.8356	1.5818	105
TFP growth	0.5537	0.5921	4.3036	-2.4059	1.0528	105
Share of employed	3.1503	2.8767	11.498	1.4405	1.6893	105
δ Share of value added	0.1394	-0.0181	11.112	-3.0215	1.6489	105
δ Relative skill intensity	1.2481	0.8544	11.071	-1.7076	1.9211	90
Relative high skilled wage	-0.0176	0.0093	0.6125	-0.7796	0.2410	90
δ Education	0.3444	0.2967	1.2000	-0.0600	0.2319	105
Inflation	4.0474	2.5858	17.9017	0.2785	3.5758	105
δ Opennes to Trade	3.4737	2.1526	42.088	-27.5981	8.3760	105
Government consumption	20.0347	19.288	26.9169	14.9619	3.0723	105

Notes: The prefix δ designates that the first difference has been taken on that variable, due to the presence of a unit root.

Table 2

Country data on the variables associated with the financial sector.

Country	SHEMP 1970	SHEMP 2007	SHVA 1970	SHVA 2007	SKILL 1985	SKILL 2005	WAGE 1985	WAGE 2005
Austria	1.60	2.76	2.97	5.39	-1.18	3.35	1.54	1.56
Belgium	2.82	3.19	9.71	5.16	4.73	13.11	2.59	1.44
Denmark	2.23	2.91	9.87	5.57	- 0.55	3.77	2.03	1.37
Finland	1.67	1.60	1.80	3.83	17.06	22.98	0.93	1.25
France	2.18	3.08	3.50	4.34	2.93	11.02	1.01	1.32
Germany	2.33	3.02	2.31	2.97		1.62		1.06
Greece	1.05	2.44	5.90	3.27		20.79		0.65
Ireland	1.28	4.41	1.62	10.72		23.55		1.26
Italy	1.19	2.53	3.63	5.05	7.06	2.88	2.61	1.51
Luxembourg	5.23	11.53	5.49	27.11		13.69		2.07
Netherlands	2.61	3.36	2.30	4.55	- 0.72	8.72	1.06	1.42
Portugal	1.54		8.06			23.91		1.32
Spain	1.35	1.88	1.38	5.00	5.07	29.30	1.16	1.28
Sweden	1.18	2.14	5.45	2.81	8.21	12.99	1.66	1.74
United Kingdom	2.36	3.87	3.60	9.05	6.03	8.43	1.56	1.59
Mean	2.04	3.48	4.51	6.77	4.87	13.34	1.61	1.39

3.3. Results

3.3.1. Growth, productivity, and the allocation of labour and income

The effect of the share of employed can be seen in table 3. Regression (1) and (2) represent the effect on GDP per capita growth. In both regressions, neither the linear nor the quadratic term of the share of employed are independently significant. They are, however, jointly significant in regression (2), and 7

observations are one standard deviation above the threshold. The outlier Luxembourg is removed in table 6 (see the appendix). This improves the significance of the individual terms on the effect on GDP per capita growth, indicating that Luxembourg might be somewhat disruptive to the sample. The lack of joint significance in regression (2) and the lack of observations one standard deviation above optimal, makes it however not possible to rule out that the relationship between GDP per capita growth and the share of employed is diminishing, instead of u-shaped.

Regression (5) and (6) in table 3 show the effect the share of employed has on TFP growth. As can be seen in regression (5) only the quadratic term is significant at the 10% level, when most control variables are omitted. In regression (6) all control variables are present and the linear term is significant at the 10% level, and the quadratic at the 5% level. Jointly, nonetheless, both regressions show significance at the 5% level. Again 7 observations exceed the threshold with more than one standard deviation. All of those belong to Luxembourg. This raises the concern that the indications of a u-shaped relationship are driven by this outlier. As can be seen in table 6 this proves to be true. The turning point is significantly lowered from 6 percentage points to around 3 percentage points. Despite this, no observations exceed the turning point sufficiently to eliminate the possibility that the relationship is simply diminishing.

Regarding the effect of the share of employed in the financial sector, it can be concluded that it has a positive effect on the GDP per capita growth that diminishes as the financial sector becomes too big. The regressions do, nonetheless, lack individual significance when the full sample is used, and joint significance when Luxembourg is omitted. Therefore, the results are not very strong. More can be said about the effect of finance on TFP growth. It is clear that the financial sector has a positive impact on productivity up until it has absorbed certain share of the labour force. After this point, the marginal effect of the financial sector seems to disappear.

Concerning of the share of value added of the financial sector, its effect on GDP per capita growth and TFP growth, can be seen in table 3. None of the terms of the share of value added show individual significance, and only regression (3) shows joint significance. Similar results are found when removing the outlier Luxembourg in table 5. Hence, it can be concluded that changes in the rate of change of the share of value added of the financial sector can neither describe changes in economic growth, nor productivity growth.

Table 3

Panel regressions of the share of persons engaged and the share of value added

	GDP per capita growth				TFP growth			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of employed$_{t-1}$	1.0284	1.0504			0.6686	1.1924*		
	(0.6833)	(1.1291)			(0.5556)	(0.6472)		
Share of employed$^2_{t-1}$	-0.0618	-0.0734			-0.0562*	-0.0946**		
	(0.0400)	(0.0646)			(0.0326)	(0.0402)		
δ Share of value added$_{t-1}$			0.1639	-0.1324			-0.0638	-0.0406
			(0.1670)	(0.1995)			(0.1329)	(0.1654)
δ Share of value added$^2_{t-1}$			-0.0012	0.0039			0.0039	0.0008
			(0.0060)	(0.0065)			(0.0051)	(0.0054)
δ Education$_{t-1}$	-0.4928	-0.2017	-0.5049	-0.1274	-0.4006	-0.4507	-0.1974	-0.2213
	(0.4376)	(0.8979)	(0.4252)	(0.5883)	(0.3590)	(0.4891)	(0.3255)	(0.4349)
Inflation$_{t-1}$		-0.0570		-0.1037*		0.0578		0.0001
		(0.0813)		0.0527		(0.0490)		(0.0462)
δ Openness to Trade $_{t-1}$		0.0644***		0.0544**		0.0325		0.0156
		(0.0225)		0.0221		(0.0199)		(0.0190)
Government consumption $_{t-1}$		-0.0308		-0.1191		0.1044		0.0158
		(0.1273)		0.0950		(0.0929)		(0.0876)
Joint Significance (F-stat)	0.3058	0.0069	0.0874	0.8022	0.0405	0.0117	0.5844	0.9196
Number of Observations	165	154	165	154	165	154	165	154
Adjusted R-squared	0.3712	0.4179	0.3870	0.4031	0.2548	0.2848	0.2298	0.2172
White statistic	50.4837	44.6347	50.2298	54.40204	46.3678	79.4075	52.3644	82.46515
Durbin-Watson statistic	1.5567	1.7523	1.5894	1.7644	1.6327	1.6177	1.5719	1.5178
Jarque-Bera statistic	17.6557	9.3381	14.3952	5.1137	16.8296	20.1048	6.5392	9.5974
Turning point		7.16			5.95	6.30		
Countries over optimal (2007)		1			1	1		
Observervations one standard deviation above optimal		7			7	7		

Notes: Robust standard errors in parenthesis. JS (F-stat) represents the p-value of the F-statistics of the joint significance of either SHEMP and SHEMP2, or SHVA and SHVA2. Turning point denotes point at which the effect of the size of finance turns from positive to negative. Subsequently, countries over optimal (2007) stands for the number of countries above the turning point year 2007. The standard deviation used in Observations one standard deviation above optimal, is the standard error found in Table 1 for the explaining variable in question. ***, **, and * indicate levels of significance of 1 percent, 5 percent, and 10 percent respectively. All explaining variables were lagged one period to avoid simultaneity. The prefix δ designates that the first difference has been taken on that variable, due to the presence of a unit root.

3.3.2. Growth, productivity, and the allocation of skill and wages

Table 4 presents regressions of the relative skill intensity and the relative high skilled wage. Regressions (1) and (2) show the effect the relative skill intensity has on GDP per capita growth. The linear term is significant at the 0.1% level for both regressions, while the quadratic term is significant at the 10% level in the regression where most control variables are omitted, and at the 5% level when they are all present. Furthermore, both regressions show joint significance. The regressions indicate that too much skill is allocated to the financial sector, when the rate of change of the relative skill intensity is approximately 21-25 percentage points. This is a very high rate of change, and naturally no observations exceed the thresholds with more than one standard deviation. Table 7 in the appendix show the regressions omitting Spain. The quadratic term loses its individual significance but the joint significance remains. The turning point is also increased somewhat. The relationship between economic growth and the rate of change of the relative skill intensity thus seems to be that of diminishing returns to scale. The turning point is however so high, that little can be said about the effect as the rate of change in a country approaches this level.

The effect of the relative skill intensity on TFP growth is shown in regressions (5) and (6). Here only the linear term stays significant at the 5% level, while the quadratic term is consistently individually insignificant. Jointly only regression (6) show significance. In table 7, Spain has been removed, which does not affect the terms' individual significance. The joint significance is, however, improved, and the turning point is lowered to around 21 percentage units, resulting in several countries having values of skill intensity above it. Due to the turning point being very high, it can only be concluded that the contribution of the relative skill intensity decreases as the rate of change increases.

The effect of the relative high skilled wage on the economic growth is shown in regressions (3) and (4) in table 4. The terms are jointly significant when all control variables are included. This result is, nonetheless, not robust when only the variable Education is included. Furthermore, the Jarque-Bera statistic indicates that the error term is not normally distributed. When Luxembourg is omitted as in table 7, all significance disappears. The effect of the relative high skilled wage is thus not robust on GDP per capita growth.

Similarly, when regressing the relative high skilled wage on TFP growth, the joint significance disappears when most control variables are excluded. Moreover, the significance disappears when Luxembourg is no longer included. Therefore the effect on TFP growth is not robust either.

Table 4

Panel regressions of the relative skill intensity and the relative high skilled wage

	GDP per capita growth				TFP growth			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
δ Relative skill intensity$_{t-1}$	0.3828***	0.3188***			0.2236**	0.2031**		
	(0.1420)	(0.0920)			(0.1062)	(0.0905)		
δ Relative skill intensity$^2_{t-1}$	-0.0076*	-0.0074**			-0.0038	-0.0032		
	(0.0044)	(0.0032)			(0.0026)	(0.0025)		
Relative high skilled wage$_{t-1}$			0.0694	5.1156*			2.9480	5.5993*
			(3.5002)	(2.9393)			(2.6422)	(2.8448)
Relative high skilled wage$^2_{t-1}$			0.1807	-1.0675			-0.7563	-1.4005*
			(0.9580)	(0.7163)			(0.7171)	(0.7785)
δ Education$_{t-1}$	0.0353	0.4985	0.5814	0.4470	0.6723	0.4323	0.4582	0.4070
	(0.4096)	(0.7043)	(0.8259)	(0.4114)	(0.6097)	(0.6138)	(0.5765)	(0.5701)
Inflation$_{t-1}$		-0.4687***		-0.4184***		-0.1112		-0.1493*
		(0.1083)		(0.0901)		(0.1022)		(0.0759)
δ Openness to Trade $_{t-1}$		0.0368		0.0545**		0.0120		0.0209
		(0.0230)		(0.0235)		(0.0225)		(0.0222)
Government consumption $_{t-1}$		0.1753		0.1275		0.2383		0.2664*
		(0.1709)		(0.1681)		(0.1840)		(0.1594)
Joint Significance (F-stat)	0.0236	0.0033	0.4431	0.0226	0.1121	0.0900	0.4839	0.0464
Number of Observations	81	81	86	86	81	81	86	86
Adjusted R-squared	0.6001	0.7576	0.5060	0.7259	0.4922	0.5284	0.3909	0.5056
White statistic	32.394	61.0283	33.54575	61.33028	48.8360	60.4563	51.377	59.7362
Durbin-Watson statistic	1.5554	1.5927	1.4233	1.9174	1.5506	1.6268	1.4145	1.7152
Jarque-Bera statistic	88.6419	39.2275	32.2591	0.9389	111.1398	65.2771	61.2257	14.0407
Turning point	25.12	21.47		1.59		31.92		2.00
Countries over optimal (2005)	0	0				0		
Observervations one standard deviation above optimal	0	0		10		0		3

Notes: Due to data limitations, the regression was made with the timespan 1985-2005. Robust standard errors in parenthesis. All explaining variables were lagged one period to avoid simultaneity. The first difference of SKILL, EDU, TRADE, and GC were taken to, due to them having a unit root. JS (F-stat) represents the p-value of the F-statistics of the joint significance of either SKILL and SKILL2, or WAGE and WAGE2. Turning point denotes point at which the effect of the size of finance turns from positive to negative. Subsequently, countries over optimal (2005) stands for the number of countries above the turning point year 2005 (note that the turning point for the relative skill intensity denotes the first difference of the value in 2005, since the first difference was taken of that variable). The standard deviation used in Observations one standard deviation above optimal, is the standard error found in Table 1 for the explaining variable in question. ***, **, and * indicate levels of significance of 1 percent, 5 percent, and 10 percent respectively. The prefix δ designates that the first difference has been taken on that variable, due to the presence of a unit root.

3.2.3. Causes and implications

The financial sector in terms of skill and labour certainly has an impact on the aggregate. This impact is found to be positive, but decreases as the financial sector absorbs more and more human capital. It cannot be concluded that the effect of the financial sector eventually becomes negative, which leads to the conclusion that the negative effects of finance does not dominate the positive effects.

The non-monotonous relationship with TFP growth is, however, stronger than the relationship is with GDP per capita growth, especially when the share of employed is used. The reason why the impact is stronger on TFP growth is most likely that the negative impact of the drain of personnel from innovative sectors is more strongly reflected here. After all, innovations should mainly affect the productivity of the economy unless completely new markets are created as a result. The negative impact on productivity is probably to some extent outweighed by the contribution of finance in capital allocation and accumulation when looking at GDP per capita growth. If the effect of finance on capital accumulation is linear and positive, it should mitigate the negative effect of the misallocation of labour, thus possibly making the effect on GDP per capita less significant.

The effect of the financial sector is seen much more clearly when using the share of employed than when using the relative skill intensity. This is somewhat unexpected considering that the relative skill intensity is a much finer instrument when estimating the allocation of talent in the economy. The time frame used for the relative skill intensity is, nonetheless, different from the one used when regressing the share of employed. The regressions using the share of employed were for that reason remade using the shorter time frame of 1985-2005 as can be seen in table 8. Compared to the results presented in table 3 and table 6, the regressions using the shorter time frame have to a greater extent individually insignificance. The results using the share of employed remains stronger than when using the relative skill intensity, which leads to the conclusion that the time frame does not lie behind the difference in strength. The number of observations is in all regressions larger for the share of employed. It is possible that this is the reason for the sparse significance of the regressions with the relative skill intensity, since a low number of observations makes it harder to distinguish the regression coefficients from zero. Another possible explanation is that the variable share of employed to the financial sector picks up the overall size effect of private credit reported by among others Arcand et al. (2015) and Samargandi et al. (2015). This would not be surprising as the share of employed is in fact a measurement of the size of the financial sector. The diminishing relationship found when using the relative skill intensity, does, nonetheless, confirm that the size effect does not solely drive the relationship between the share of employed and productivity, and that misallocation of labour must play some role in explaining the non-monotonous contribution of financial sector size.

The effect of the financial sector in terms of the share of value added and the relative high skilled wage, seems to be robustly non-existent. The relative high skilled wage showed some significance, however, this result is treated as false, since no other regressions trying to capture the impact of income portrayed this effect.

The difference in ability to explain the aggregate between income variables and skill variables might seem puzzling at first. One might assume that high wages in a particular sector would attract labour to that sector, and because of this, changes in employment should mirror changes in wages. Changes in the labour and skill variables do not necessarily correspond to changes in the income proxies, however, which makes it unlikely that changes in income can explain changes in labour allocation or skill composition. Therefore, the proxies for income do most likely not measure the same thing as the proxies for labour. Nevertheless, this does not mean that high wages in finance do not attract labour. As can be seen in table 2, the relative high skilled wage has been above one for most countries, meaning that there has been a wage premium for skilled labour in finance. Over time this wage premium will have attracted skilled labour from other sectors, raising the relative skill intensity of the financial sector. Thus, changes in the relative skill intensity have most likely been brought about by the existence of a wage premium, rather than changes in relative income.

The relationship between income and labour of a sector could also go the other way. When the employment share of a sector goes up, one would naturally assume that the output share of that sector would follow. As can be seen in table 2, the share of value added has in fact decreased for some countries, while the share of employment has increased. This suggests that the financial sector, while occupying more of the labour force in all countries, does not seem to generate more value relative to the total economy. This coupled with the results in this thesis regarding the non-monotonous effect of employment and skill in the financial sector, and the absence of an effect of income, clearly indicates that the financial sector might be overcrowded in some countries. Put differently, more and more labour and skill is allocated to the financial sector, which creates little value for the industry and does not contribute towards productivity growth. The lack of value created by more workers in finance could be related to increased asset trading. Asset trading is by definition a zero-sum game, since the profit of one trader comes at a loss of others. Hence, it is likely that if the financial sector expands due to asset trading, the industry aggregate sees no increase in income, and thus that the labour would socially be better allocated elsewhere. Individual firms with skilled traders can, nonetheless, benefit from more asset trading. An example of the growing importance of asset trading can be found in the USA (Greenwood and Scharfstein, 2013).

The results of this thesis, suggests that the financial sector has diminishing returns to scale. This calls for a re-evaluation of the impact of finance and that policies be considered to limit the expansion of the financial sector. If asset trading lies behind the increased labour usage and the allocation of skill, stricter regulation could limit the size of the financial sector. This kind of policy could, however, have unwanted complications, as reduced asset trading could have a negative impact on the liquidity of stock markets. In turn a reduction of the liquidity of the stock markets could negatively affect economic growth (Levine and Zervos, 1998). Another policy to be considered is the taxing of the financial sector. The effects of taxation could very well depend on the origin of the positive externalities of innovation. If the externalities are driven by physical capital, taxation of the financial

sector could potentially reduce economic growth, since less capital would be generated. If they instead are driven by human capital, taxation will increase economic growth by reducing the amount of talent allocated to the financial sector (Philippon, 2010). Considering that the financial sector has a stronger negative impact on productivity growth, the latter seems more feasible. Thus, a heavier taxation of the financial sector could be in order.

4. Conclusion

This thesis has attempted to both confirm and explain the u-shaped relationship between financial sector size and economic growth recently found by several authors (e.g. Arcand, et al. 2015). This was accomplished by using proxies for the allocation of labour to the financial sector, then regressing both linear and quadratic terms of the proxies on economic and productivity growth. The regressions indicate a robust positive but diminishing contribution of the skill and labour usage of finance on productivity growth. A u-shaped relationship can, nevertheless, not be established. This indicates that the aggregate indeed benefits from financial sector usage of human capital. This effect declines, however, as the financial sector absorbs more and more labour and talent, up to the point where the effect on the aggregate disappears. The strong effect on productivity suggests that the financial sector absorption of labour mainly harms innovative sectors, which previously has been documented in firm-level studies (Kneer, 2013a, 2013b, Cecchetti and Kharoubi, 2015). The diminishing relationship is, found to be weaker when regressing on GDP per capita growth. This implies that skill and labour accumulation in the financial sector facilitates growth by achieving a more efficient allocation of capital, and that this function mitigates the negative aspects of misallocation.

Overall, we can see that the financial sector can become large enough for its contribution to disappear. The marginal effect of financial sector labour usage does, nonetheless, not become negative, which indicates that the negative aspects of finance (e.g. brain drain from innovative sectors) never become larger than the positive effects.

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6. Appendix

Table 5
Unitroot tests, Levin, Lee, & Chu

	Test statistic	p-value
GDP per capita growth	-5.0802	0.0000
TFP growth	-2.7882	0.0027
Share of employed	-5.6971	0.0000
Share of value added	0.4901	0.6880
Relative skill intensity	2.1475	0.9841
Relative high skilled wage	-2.2711	0.0116
Education	1.6333	0.9488
Inflation	-3.7925	0.0001
Opennes to Trade	4.3116	1.0000
Government consumption	-6.2072	0.0000

Table 6

Regressions of the share of persons engaged and the share of value added excluding an outlier

	GDP per capita growth				TFP growth			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of employed$_{t-1}$	3.0257**	2.6680**			3.4742***	3.6575***		
	(1.3698)	(1.3132)			(1.1307)	(1.2132)		
Share of employed$^2_{t-1}$	-0.4567*	-0.4135*			-0.6072***	-0.6218***		
	(0.2593)	(0.2304)			(0.2203)	(0.2333)		
δ Share of value added$_{t-1}$			-0.0139	-0.0819			0.0731	-0.0211
			(0.1843)	(0.2030)			(0.1632)	(0.1669)
δ Share of value added$^2_{t-1}$			0.0042	0.0055			-0.0018	0.0000
			(0.0073)	(0.0067)			(0.0052)	(0.0052)
δ Education$_{t-1}$	0.2020	0.7331	-0.1043	0.5038	0.2748	0.2624	-0.0801	0.0150
	(0.4409)	(0.5733)	(0.5251)	(0.6108)	(0.3730)	(0.4605)	(0.3683)	(0.5208)
Inflation$_{t-1}$		-0.0626		-0.0984*		0.0452		0.0214
		(0.0057)		(0.0507)		(0.0454)		(0.0448)
δ Openness to Trade $_{t-1}$		0.0769		0.0730**		0.0250		0.0272
		(0.0220)		(0.0227)		(0.0206)		(0.0234)
Government consumption $_{t-1}$		-0.0906		-0.1070		0.0109		0.0132
		(0.1108)		(0.0930)		(0.0817)		(0.0888)
Joint Significance (F-stat)	0.0559	0.1295	0.5165	0.4412	0.0088	0.0116	0.8941	0.9551
Number of Observations	154	143	154	143	154	143	154	143
Adjusted R-squared	0.3844	0.4491	0.3529	0.4262	0.3017	0.3141	0.2231	0.2248
White statistic	43.1981	61.0418	45.2629	54.8222	66.4564	87.2610	55.5358	81.9856
Durbin-Watson statistic	1.5444	1.8079	1.4772	1.7645	1.6886	1.6156	1.5378	1.4833
Jarque-Bera statistic	18.4067	12.4111	7.9120	7.9144	4.1584	16.8399	9.9964	15.1960
Turning point	3.31	3.23			2.86	2.94		
Countries over optimal (2007)	2	3			6	6		
Observervations one standard deviation above optimal	0	0			0	0		
Omitted country	Luxembourg	Luxembourg	Luxembourg	Luxembourg	Luxembourg	Luxembourg	Luxembourg	Luxembourg

Notes: Omitted country refers to the outlier that was omitted in the regression. Robust standard errors in parenthesis. All explaining variables were lagged one period to avoid simultaneity. The first difference of SHVA, EDU, TRADE, and GC were taken to, due to them having a unit root. JS (F-stat) represents the p-value of the F-statistics of the joint significance of either SHEMP and SHEMP2, or SHVA and SHVA2. Turning point denotes point at which the effect of the size of finance turns from positive to negative. Subsequently, countries over optimal (2007) stands for the number of countries above the turning point year 2007. The standard deviation used in Observations one standard deviation above optimal, is the standard error found in Table 1 for the explaining variable in question. ***, **, and * indicate levels of significance of 1 percent, 5 percent, and 10 percent respectively. All explaining variables were lagged one period to avoid simultaneity. The prefix δ designates that the first difference has been taken on that variable, due to the presence of a unit root.

Table 7

Regressions of the relative skill intensity and the relative high skilled wage excluding an outlier

	GDP per capita growth				TFP growth			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
δ Relative skill intensity$_{t-1}$	0.3637**	0.2838**			0.2672**	0.2557**		
	(0.1657)	(0.1185)			(0.1104)	(0.0992)		
δ Relative skill intensity$^2_{t-1}$	-0.0071	-0.0059			-0.0063	-0.0061		
	(0.0067)	(0.0054)			(0.0054)	(0.0051)		
Relative high skilled wage$_{t-1}$			-1.5524	3.6754			1.700	4.6063
			(3.4506)	(2.9604)			(2.7541)	(2.9660)
Relative high skilled wage$^2_{t-1}$			0.5771	-0.6961			-0.4443	-1.1374
			(0.9426)	(0.8061)			(0.7440)	(0.8037)
δ Education$_{t-1}$	1.3841	0.5652	0.6272	0.5399	0.6025	0.3908	0.5639	0.5303
	(1.1286)	(0.8729)	(0.8282)	(0.5812)	(0.6878)	(0.7648)	(0.6035)	(0.5848)
Inflation$_{t-1}$		-0.4646***		-0.3963***		-0.1012		-0.1358*
		(0.1070)		(0.0800)		(0.1035)		(0.0765)
δ Openness to Trade $_{t-1}$		0.0373		0.0756***		0.0115		0.0268
		(0.0235)		(0.0205)		(0.0225)		(0.0298)
Government consumption $_{t-1}$		0.1796		0.0854		0.2616		0.2543
		(0.1820)		(0.1857)		(0.1934)		(0.1628)
Joint Significance (F-stat)	0.0569	0.0122	0.5741	0.1090	0.0593	0.0375	0.8177	0.1391
Number of Observations	75	75	81	81	75	75	81	81
Adjusted R-squared	0.6001	0.7493	0.5108	0.7455	0.4143	0.4574	0.4160	0.5197
White statistic	36.4270	61.2974	36.6204	59.4791	57.5430	55.2437	55.6026	64.1579
Durbin-Watson statistic	1.5598	1.5811	1.3494	1.8465	1.5758	1.6911	1.3238	1.6201
Jarque-Bera statistic	62.2522	23.2612	40.0406	1.8529	80.4266	51.4874	59.9744	18.1943
Turning point	25.61	24.05			21.21	20.96		
Countries over optimal (2005)	0	0			0	0		
Observervations one standard deviation above optimal	0	0			0	0		
Omitted country	Spain	Spain	Luxembourg	Luxembourg	Spain	Spain	Luxembourg	Luxembourg

Notes: Due to data limitations, the regression was made with the timespan 1985-2005. Robust standard errors in parenthesis. All explaining variables were lagged one period to avoid simultaneity. The first difference of SKILL, EDU, TRADE, and GC were taken to, due to them having a unit root. JS (F-stat) represents the p-value of the F-statistics of the joint significance of either SKILL and SKILL2, or WAGE and WAGE2. Turning point denotes point at which the effect of the size of finance turns from positive to negative. Subsequently, countries over optimal (2005) stands for the number of countries above the turning point year 2005 (note that the turning point for the relative skill intensity denotes the first difference of the value in 2005, since the first difference was taken of that variable). The standard deviation used in Observations one standard deviation above optimal, is the standard error found in Table 1 for the explaining variable in question. ***, **, and * indicate levels of significance of 1 percent, 5 percent, and 10 percent respectively. The prefix δ designates that the first difference has been taken on that variable, due to the presence of a unit root.

Table 8

Regressions of the share of persons engaged for the time period 1985-2005

	GDP per capita growth				TFP growth			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of employed$_{t-1}$	1.6623	0.8598	4.6418**	3.7399	0.5640	0.7385	5.1849***	6.0881***
	(1.2258)	(1.5673)	(2.4025)	(2.5625)	(0.9127)	(1.2839)	(1.7263)	(0.9636)
Share of employed$^2_{t-1}$	-0.1237*	-0.0925	-0.6981**	-0.7411*	-0.0637	-0.0793	-0.9450***	-1.1138***
	(0.0678)	(0.0867)	(0.4406)	(0.4061)	(0.0524)	(0.0740)	(0.3763)	(0.4164)
δ Education$_{t-1}$	0.5140	0.9959	0.6983	0.9668	0.3986	0.4428	0.7442	0.8201*
	(0.6709)	(0.6533)	(0.6887)	(0.6196)	(0.4517)	(0.5358)	(0.4757)	(0.4770)
Inflation$_{t-1}$		-0.1177		-0.1195		0.0184		0.0462
		(0.0948)		(0.0924)		(0.0765)		(0.0654)
δ Openness to Trade $_{t-1}$		0.0628**		0.1022***		0.0213		0.0227
		(0.0303)		(0.0343)		(0.0210)		(0.0221)
Government consumption $_{t-1}$		-0.1822		-0.2461*		0.0282		-0.0287
		(0.1441)		(0.1393)		(0.0853)		(0.0882)
Joint Significance (F-stat)	0.0005	0.0019	0.1389	0.1813	0.0051	0.0032	0.0062	0.0097
Number of Observations	105	100	98	93	105	100	98	93
Adjusted R-squared	0.5238	0.5869	0.5297	0.6190	0.4032	0.4137	0.4852	0.5149
White statistic	41.5658	58.1996	43.4330	59.4419	54.6291	67.6763	47.2132	60.5426
Durbin-Watson statistic	1.6496	2.1776	1.4592	1.8520	1.8203	2.0717	1.8432	1.8497
Jarque-Bera statistic	29.7358	13.2296	60.2148	9.7541	31.4614	16.6044	10.8747	11.5720
Turning point	6.71	4.65	3.32	2.52	4.43	4.66	2.74	2.73
Countries over optimal (2007)	1	1	3	8	1	1	8	8
Observervations one standard deviation above optimal	7	8	0	1	8	8	0	0
Omitted country			Luxembourg	Luxembourg			Luxembourg	Luxembourg

Notes: The time period was shortened to 1985-2005. Omitted country refers to the outlier that was omitted in the regression. Robust standard errors in parenthesis. All explaining variables were lagged one period to avoid simultaneity. The first difference of SHVA, EDU, TRADE, and GC were taken to, due to them having a unit root. JS (F-stat) represents the p-value of the F-statistics of the joint significance of SHEMP and SHEMP2. Turning point denotes point at which the effect of the size of finance turns from positive to negative. Subsequently, countries over optimal (2007) stands for the number of countries above the turning point year 2007. The standard deviation used in Observations one standard deviation above optimal, is the standard error found in Table 1 for the explaining variable in question. ***, **, and * indicate levels of significance of 1 percent, 5 percent, and 10 percent respectively. All explaining variables were lagged one period to avoid simultaneity. The prefix δ designates that the first difference has been taken on that variable, due to the presence of a unit root.