Capital openness and the decline of the labor share : is financial liberalization impacting factor distribution of income?*

Cyprien Batut

June 8, 2015

Under the supervision of Thomas Breda, PSE
Referee: Philippe Askenazy, PSE and CEPREMAP

Abstract

Only few papers study the distributional consequences of the opening of capital account. We try in this master thesis to fill this gap and answer the concern that globalization may have an impact on personal and factor distribution of incomes. We use a consistent cross country panel of labor shares and several indexes of capital account openness to find evidences of this impact. We also complement this approach at the sector level in the way of Rajan & Zingales (1998). Both specifications indicate a persistent negative effect of capital account openness on the labor share of income across countries, sectors and in various specifications. This effect is partly explained by the fact that the threat point of capital increases as it gains additional mobility. These findings are consistent with Jayadev (2007) but they also bring the evidence that the decline of labor share is indeed caused by a loss of bargaining power of the workforce since 1980.

*The helpful comments of Son-Thierry Ly, Anne-Celia Disdier and especially Thomas Breda are gratefully acknowledged.

Contents

1 Introduction

> *Of the tendencies that are harmful to sound economics, the most seductive, and in my opinion the most poisonous, is to focus on questions of distribution. [...] But of the vast increase in the well-being of hundreds of millions of people that has occurred in the 200-year course of the industrial revolution to date, virtually none of it can be attributed to the direct redistribution of resources from rich to poor. The potential for improving the lives of poor people by finding different ways of distributing current production is nothing compared to the apparently limitless potential of increasing production.*
>
> – Robert E. Lucas Jr. (2003)

Financial liberalization is often seen as a game where everybody wins and which will eventually lead to an increase of the well-being of the many. However, for more than a decade, beginning with Blanchard (2002), the political economy of globalization is questioning its distributional consequences. Increased capital mobility relative to labour ability and increased global competition are likely to decrease rents and quasi-rents in production. In addition, it seems that the bargaining over this reduced rents changed as well. In this context, we observe two major trends: a decrease of the labour share of income and a dramatic increase of cross border capital flows.

The increase of cross border capital flows is global and is the result of financial liberalization. It is also the consequence of a general and conscious move in developed countries toward capital openness. A financially liberalized country is said so when domestic, capital accounts, and stock markets are free of capital controls. In general, the different liberalization reforms are complementary, that is why opening of capital account might also be seen as the financial side of international trade opening. The point is that the opening of capital account is implemented by administrative measures, enforced by sovereign states and supported by international institutions. In the last decades, the IMF was clearly pushing for capital opening in developing countries (it is one of the important part of the Washington consensus in the 90's but this trend was stopped with the 2008 crisis) but it only follows the evolution that started in the 1970's in developed countries. Such policies are indeed expected to bring many benefits : receiving more capital inflows to finance higher investment and growth, insuring against aggregate shocks and reducing consumption volatility and finally accelerating the development of

domestic financial markets and achieve a more efficient domestic allocation of capital and better sharing of individual risks. The literature on the impact of the opening of capital account does not find such clear benefits: a classic work like Rodrick (1998) even questioned the usefulness of such policy.

Coincidently, the labour share also experienced an astonishing evolution. Indeed, relative shares in term of value added have been fairly constant over long periods of time, which was seen by Keynes (1939) as "a bit of a miracle". That is why stability of the labour share became a fundamental feature of macro models since the 40's. But starting in the 80s, this state of facts fundamentally changed. We observe in most of the OECD country a decrease by more than 5 percentage points of the labour share since then. As shown in Askenazy, Cette & Sylvain (2011), what this decline tells us is not straightforward as models predicting such a decline generally rests on many rough assumptions. Still, one likely culprit is of course globalization. Because of globalization and increased global competition, the bargaining over the reduced rents in the labor market changed. So, it means also that financial liberalization might had distributional consequences over the sharing between capital and labour at the expense of labour. A potential explanation could be that capital can more easily seek higher returns from abroad than before and so enhances its position in a strategic bargain with labour.

Despite the relatively big publicity given to those two evolutions in the literature (see the numerous articles about those two subjects, notably Karabarbounis & Neiman (2013) on the decline of the labour share) and the apparent simplicity of this narrative, there have been only few attempts to test the effects of openness to capital flows on the share of income going to labour at the economy wide level and none at the sector level. Of course, theoretical studies have already investigate the evolution of the strategic bargain between capital and labour in a Nash bargaining framework : Rodrick (1997) for exemple or even Choi (2001) which focus on this issue in the context of US unions. But the macroeconomic consequences for macro-level outcomes is still more or less unstudied except by few papers. First of all, Jayadev (2007), on the basis of a cross country analysis and using a double-difference approach, finds that capital mobility has a direct negative impact on the labour share of income, except for low-income countries. It suggests that openness reduces the bargaining position of labour and then the share of income going to labour, but also shows that this effect is concentrated in more developed economies for unexplored reasons in this paper. Then, Larrain (2015) and P.B. Henry et al. (2012) also study the impact of capital open-

ing on the labor market and more specifically on wages. In one hand, P.B. Henry et al. (2012) finds that capital opening increases wage of low skilled labor in emerging countries. Opening up to foreign capital increases investment, which in turn drives up productivity and wages. However, he finds no conclusive evidence of an impact of capital openness on the capital share and only looks at developing countries. In the other hand, Larrain (2015) finds that capital opening increases wage inequality between low-skilled and high-skilled labor. He uses a two fold empirical strategy : a country level analysis using a generalized difference-in-difference test and a sector-level one using the Rajan & Zingales index of financial dependence. He argues that capital account opening allows firm to raise capital that embodies superior technology and then will increase the demand for high skill labor which is complementary with capital relatively to low skill labor.

Our aim in this master thesis is to follow up on the analysis of the macroeconomic consequences of capital openness on the labour share. We use the EUKLEMS sectorial dataset on 25 countries between 1970 and 2005 to do an aggregated analysis at the country level. However, unlike Jayadev (2007), we use two different De jure index of capital openness[1] : the one from Chinn & Ito (2006) and the liberalization dates from Kaminsky & Schmuckler (2007). Moreover, like Larrain (2015), we complement this country level analysis and test it at the sector level using the Rajan & Zingales (1998) approach. This sector level analysis is the true addition of this master thesis to the literature on the subject of capital openness and the decline of labour share.

The analysis presents a central result: controlling for various contemporaneous factors and with different index of capital openness, the opening of capital account has a negative impact on the labour share of income. Moreover, looking at the sector level analysis, we find that this effect is concentrated on non-financially dependent sectors, which brings further evidences strengthening the robustness of our results. These findings provide support for the argument that openness reduces the bargaining position of labour and then the share of income going to labour. In our extension, we also find that this effect is concentrated on low skilled workers.

Finally, we believe that this Master thesis, by showing that capital openness accounts for one part of the labor share decline of the past 30 years, brings indirect evidences that this decline is not only driven by market me-

[1]They use the one from Lee & Jayadev (2003)

chanics[2] but also reflects a real lose in the bargaining power of labour.

This Master thesis is organized as follow. In Section 2, we consider data and general trend issues. In Section 3, thanks to two models, we describe the possible theoretical linkages between capital account openness and the labour share movement. Section 4 explains the methodological approaches used in this thesis. And finally section 5 provides a summary of the results as well as some robustness checks and extensions.

2 Data & Trend issues

2.1 Capital account liberalization policies

In the last three decades, most of developed countries financial markets have been dramatically liberalized. This evolution could be summed up evoking three big dimensions: removal of capital account controls, less regulation on domestic financial market and liberalization of the domestic stock market. There are several criteria to define financial liberalization episodes on those three dimensions as summarized in Kaminsky & Schmuckler (2003) and we will now present them.

To begin with, capital accounts are considered as not liberalized when banks and corporations are not allowed to borrow abroad safely and when reserve requirements are higher than 50%, required minimum maturity longer than five years. There are special exchange rates for current account and capital account transactions and there are also restrictions to capital flows. In the other hand, capital accounts are said to be liberalized when banks and corporations are allowed to borrow abroad freely, when reserve requirements are typically lower than 10% and when required minimum maturity is lower than two years. There are also no special exchange rate and no restrictions on capital flows.

Then, in the domestic financial sector, there is no liberalization when there are controls in lending rates and borrowing rates (ceilings and floors rates). Also, there are controls in the allocation of credit and foreign deposits are not allowed. Consequently, domestic financial sector will be seen as liberalized when all those controls are removed.

[2]Like the Pasinetti paradox supposing that the share of income accruing to factors only depends from investment rate and capitalist's saving propensity. In a way, Karabarbounis & Neiman (2013) is also an advocate of such rational.

Finally, in the last dimension, stock markets are considered as not liberalized when foreign investors are not allowed to hold domestic equities and when dividends, capital and profits can be repatriated but only after a period of 5 years. Conversely, stock markets are liberalized when foreign investors can hold domestic equities without restriction and when dividends, capital and profit can be repatriated within two years.

With this kind of definition, Kaminsky & Schmuckler (2003) are able to identify de jure episodes of financial liberalization for developed countries in our sample. That is to say the year when, in all dimensions, a country can be considered as liberalized thanks to identified key reforms. In this master thesis, we use those dates to identify break year in institutional reforms of countries implementing financial liberalization.

Here is a recap tab of those dates for countries in our dataset :

Royaume Uni	1973
USA	1973
Germany	1974
Canada	1975
Spain	1980
Norway	1981
Japan	1983
France	1985
Italy	1987
Finland	1987
Danemark	1988
Sweden	1989
Ireland	1992
Portugal	1992
Korea	1993

Table 1: Date of liberalization according to Kaminsky & Scmuckler, 2003

The history of such administrative reforms can be exemplified with the cases of Great-Britain and France. In Great-Britain, from 1973, investors were allowed to buy sterling securities and export them. Participation of foreign investors was subject to individual authorization but normally granted. In October 1973, the minimum period for foreign borrowing was reduced to two years and in the early 1980's, authorities abandoned last credit controls.

In 1973 in France, participation exceeding 20% of a quoted firms was considered as a direct investment and was subjected to the prior authorization of the ministry of finance. French and foreign securities could be sold in France and exported. Last restrictions regard foreign direct investment in existing french firms were loosened in 1989. In the capital account dimension, requirements on direct investment abroad were abolished in 1985 and in June of the same year, banks were allowed to freely contract foreign currency loans and borrow in Francs up to 50 millions. Deposit and lending interest rates ceilings were also eliminated in 1985 in the domestic finance sector.

2.2 An index of capital openness

Another possibility to account for the opening of capital account is to use an index of capital openness. Measuring openness is not easy, as a result, consensus on the subject is not to be reached in the short term. Many measures coexist to describe the extent and intensity of capital account controls, but it is generally agreed that such measures fail to fully capture the complexity of real-world capital controls for a number of reasons. Edison et al. (2002) which reviews and sum up lots of paper about capital account openness and the evidences of its impact on growth and volatility, enumerates as many ways of measuring capital account openness as papers.

The original strand in the literature to identify capital account restrictions is to look at the Annual Report of Exchange Arrangement and Exchange Restriction (AREAER) published by the IMF each year and then to make dummy variables (capital controls or no controls) out of it for countries concerned in the study. This method generally fails to account for intensity of capital controls and their subtlety because of the high aggregation of the different types of controls within the same index[3].

The AREAER has more to offer, it also provides a summary table which measures the extent and the nature of the rules and regulations governing external account transactions for a wide cross-section of countries. It ranks types of controls on cross-border financial transactions into 4 categories:

1. Existence of multiple exchange rate

2. Number and type of restriction on current account

[3]The AREAER did move toward a disaggregation of its capital account restriction category since 1997

3. Number and type of restriction on capital account

4. Regulatory requirements that the surrender of export should proceed

This kind of summary table can solve the issue of lack of subtlety mentioned above, and provides a solution to account for intensity : to use the proportion of years in the examined window for which countries had liberalized capital accounts according to the AREAER variables. Edison et al. (2002) notices however that such indicators do not convey any information about whether the country is on its way to liberalizing or restricting its capital accounts.

To remedy those issues, Chinn & Ito (2008) creates an interesting indicator of capital openness using the summary table of the AREAER in order to properly account for intensity of capital controls. It is a publicly available index on 181 countries between 1970 and 2005 based on the dummy variables in the AREAER (1: if liberalized, 0: if not) in the categories above mentioned. One specificity of this index is that on the number and types of restrictions on the capital account dimension, the Chinn & Ito index uses the average of binaries dummy on the last 5 years. The resulting index is the first standardized principal component of the measures in the four dimensions, it takes a value between 0 and 4 where 4 equals full liberalization. In this analysis, we use the index as it is or we define a threshold above which a country is considered as sufficiently liberalized, in our case, it is 0.8 (when the index is normalized between 0 and 1). Compared to other levels in the index, it is the one that seems to generate the highest increase of capital flows in and out the country.

We use this index in our analysis in addition to the liberalization dates from Kaminsky & Schmuckler (2003). All of our regression will be done using both index of capital openness.

Here is the evolution of the index for our dataset. After 2000, the mean value of the index is very close to 1, all countries in the sample are financially liberalized. The biggest movement in the index happened between 1990 and 2000, which is the decades of financial reforms in the sample.

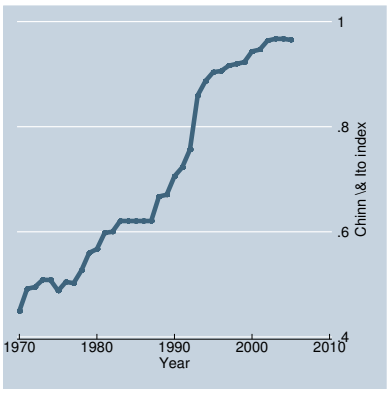

Figure 1: Evolution of mean value of the Chinn & Ito index in our sample between 1970-2005

The observed rise of the index is coincidental with the rise of gross capital flows[4] over the same period. During the decade of financial reforms (the 90's), the total size of gross capital flows was almost multiplied by five, only to double again in the next five years.

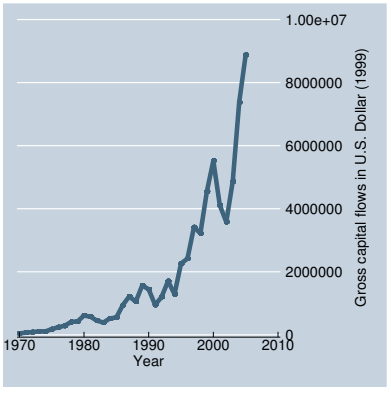

Figure 2: Evolution of aggregated gross capital flows over the past 40 years in Dollar

Graphically, it seems that at a particular level, the Chinn & Ito index doesn't drive anymore the evolution of capital flows because those are liberalized enough. That's also why in the empirical part we use it in two ways

[4]The data on the extent of capital flows was extracted from Broner, Didier, Erce and Schmukler (2013).

: as a classic dependent variable using its normalized value between 0 and 1 and to define a threshold above which we consider that a country is liberalized. Table 2 shows indeed that it is a valid strategy. Countries for which the Chinn & Ito index is greater or equal to 0.8 experience bigger gross capital flows and have an higher ratio of total liabilities over GDP.

	Mean	S.D	No.Obs
Al sample			
Total Gross Capital Flows	23.1	43.9	539
Total liabilities over GDP	2.38	10.4	817
Chinn & Ito index ≥ 0.5			
Total Gross Capital Flows	28.1	49.9	400
Total liabilities over GDP	2.90	11.8	637
Chinn & Ito index ≥ 0.8			
Total Gross Capital Flows	30.7	54.2	312
Total liabilities over GDP	3.30	12.7	544
Chinn & Ito index ≥ 0.9			
Total Gross Capital Flows	29.0	51.5	289
Total liabilities over GDP	3.43	13.0	514

Table 2: De facto indexes of capital openness in relation to the Chinn & Ito index

For France, looking at the movement of the Chinn & Ito index in relation the evolution of total liabilities over GDP ratio from Lane & Ferretti (2006) shows that this de jure index (which sums up administrative measures of capital openness) drives the de facto index of capital openness (which quantitatively measures the openness). The break in the index coincides with the break observed in the trend of the ratio between total value of liabilities over GDP. The break in the Lane & Ferretti measures also coincides with the financial reforms date from Kaminsky & Schmuckler (2003) for France.

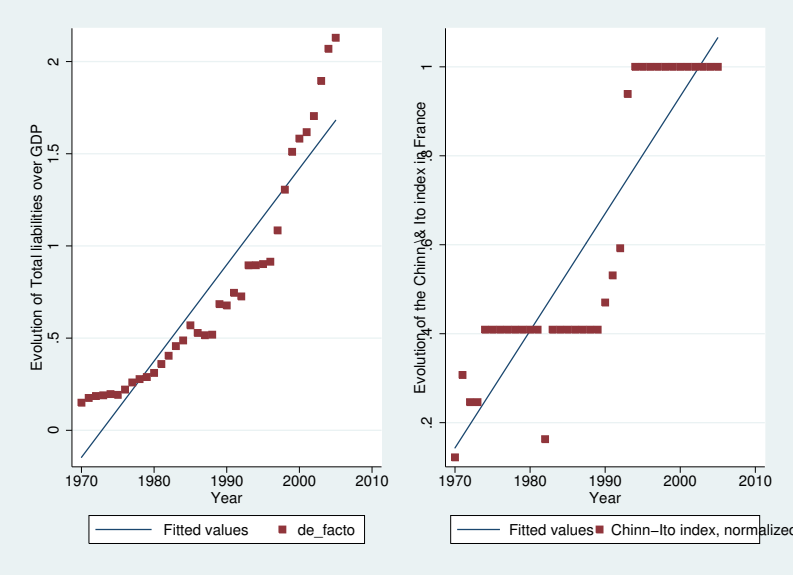

Figure 3: Evolution of the Chinn & Ito index in relation to the ratio total liabilities over GDP in France

2.3 Financially vulnerable sectors

A classic approach of financial openness in the literature has been to focus on sectors which are vulnerable to external finance. This methodology was introduced by Rajan & Zingales (1998) as they use the industry's dependence on external finance in the US as a proxy of the industry's dependence in other countries. They used data on company's financing needs in the 1980's in the Standards & Poors dataset Compustat (1994). They computed it as the amount of desired investment that cannot be financed through internal cash flows generated by the same business. The index is defined at the company level as capital expenditure minus cash flows[5] from operations divided by capital expenditures. The obtained measure then aggregated at the industry level for the 1980's.

Doing this for each sectors in every country would be problematic and is generally not done in the literature. First of all, we would need a lot of sectoral data, which are not available for enough countries in our sample. Then, such measures is likely to be endogenous in our estimations and very

[5]Sum of cash flows from operations minus decrease in inventories, decrease in receivable and increase in payables.

noisy. So that, even if the data was available, the firms dependence on external finance would clearly be affected by the characteristics of the financial system in which they operate.

The empirical strategy developed by Rajan & Zingales (1998) allows to identify an exogenous effect of financial development on firms growth and capital accumulation based on the financial vulnerability of each industry. Indeed, financial reforms, through the easing of capital controls, are expected to affect more the investments/growth in sectors where firms rely more on the use of external finance. In the present study, focusing on the impact of capital openness on the labor share movement, it is not sure that the Rajan & Zingales will work the same way. More about this in the next section and in section 4.

The measures of the index by sectors used in the present study can be found in Table 3 in the appendix.

2.4 The labor share decline

The labour share decline has been broadly documented in the literature even if this view has been recently criticized[6]. Still, we observe on average in the literature a 5 percentage points decline in the share of global corporate gross value added paid to labour over the past 35 years. It has been observed in most of developed countries and is even confirmed in regional data for the US in Karabarbounis & Neiman (2013).

We use the EUKLEMS dataset, which is a statistical and analytical research project financed by the European Commission and which gives us complete sectoral data on 35 countries from 1970 to 2005, to compute the labour share as the total labour compensation (LAB) divided by the total valued added in the sector for our countries of interest. EU-KLEMS stands for European Union level analysis of capital (K), labor (L), energy (E), materials (M), and service (S) inputs. According to the System of National Account, compensation of employees is defined as the total of wages and salaries in cash, wages and salaries in kind, and employers social contributions for sickness, accidents, and retirement to social security funds and insurance enterprises. We are aggregating this data at the country level in

[6]Recent papers asserted that there is no decreasing trend in the labour share if we don't look at the housing sector or capital replacement. This view was developed by Mathiew Rolgnie, the student from MIT who recently rose into fame

the first part of our empirical analysis and keeping it at the sector level for the second part.

The labor share decline is also present in our data, like most of papers, we also find a decline of about 4/5 percentage points of the labor share over the period of interest :

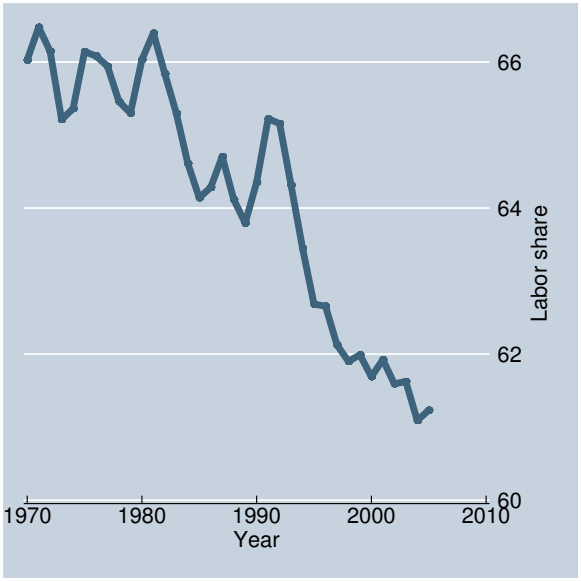

Figure 4: Evolution of the mean labor share over the past 40 years in our sample

The measurement of labor share is littered with methodological hurdles, notably because of the issue of self-employment income. As pointed out by Gollin (2002), fluctuations in labours share are significantly reduced if labours share is expanded to include self-employment income. In the EU-KLEMS documentation, it is said that because the data on self-employed hours tend to be less easily available in National Account, it is estimated from other figures. For example, in the UK, trends from employees are used to estimate self-employed hours for early years. However, the assumption used in the EUKLEMS dataset to compute labour and capital compensation is very rough (the compensation of the self-employed is assumed to equal the compensation of the employees) and leads to negative capital compensation in some industries. In general, studies indicate that compensation of a self-employed person is lower in industries like agriculture and trade, but at least

as high in business services.

Unfortunately, making the distinction between the corporate and uncorporated sectors with the EUKLEMS dataset in order to correct for this is impossible. In this dataset and analysis, this issue is solved by imputing self-employment and giving to the self-employed their sector mean wage. However, because this is likely to give biased results in some sectors, we decided to exclude them from our sector analysis: agricultural, mining, fuel, real-estate and business sectors. Those are the sectors where the bias is likely to be the biggest.

Here is, as another examples, the evolution of the labour share for two of our countries in our dataset :

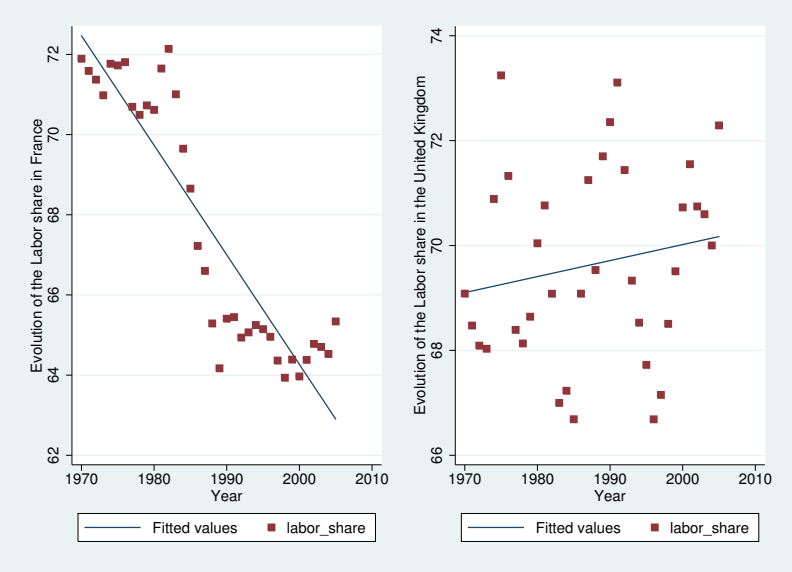

Figure 5: Labor share movement in France and in the UK over the past 40 years

While France is the perfect case to illustrate our story where the decrease of labor share coincides with the openness of capital account, it is not the case of the United Kingdom. We can observe there is a slight increase of the labor share which is also highly noisy on the contrary of other countries. It seems that the United Kingdom is an outlier in the EUKLEMS dataset as already stressed in Karabarbournis & Neiman (2013).

3 Theoretical underpinnings

3.1 Nash bargaining model

Reproducing what is already done in various papers on the impact of capital openness, we use a Nash bargaining model like in Rodrik (1997) and Choi (2001). Unlike those studies, we adapt it to the case of labor share and try not to focus only on the issue of wage but also employment.

We consider a bargaining game between a representative labour union and a firm-owner. In one hand, in a competitive market, wage and employment would be determined unilaterally by the firm owner in order to maximize profit facing market constraints, the wage level in this case would be the reservation wage w*. In the other hand, in the organized labour market employment and wage are determined through the bargaining process with ϕ and $1-\phi$ being respectively the bargaining power of the representative labour union and the representative employer. An important feature of this model is that the employer also have the possibility to relocate its capital in another country, π^* is the profit that the capital owner could do elsewhere. It is positively associated with capital mobility, i.e. the degree of ease with which capital can be moved.

The maximization problem can be written as follows :

$$Max_{w,n}\phi log[(u(w)-u(w^*))n]+(1-\phi)log(\pi-\pi^*) \tag{1}$$

n is the number of employees in the union. The utility function u of the labor union follows conventional assumption : $u'(w) \geq 0$ and $u''(w) \leq 0$. The profit function is $\pi = f(n) - wn$.

Consequently, the first order conditions are the following :

$$w : \frac{\phi u'(w)}{u(w)-u(w^*)} - \frac{(1-\phi)n}{(\pi-\pi^*)} = 0 \tag{2}$$

$$n : \frac{\phi}{n} - (1-\phi).\frac{f'(n)-w}{(\pi-\pi^*)} = 0 \tag{3}$$

Rearranging equation (2) gives us :

$$\frac{u(w^*)-u(w)}{u'(w)} = \frac{\phi}{1-\phi}.\frac{\pi-\pi^*}{n} \tag{4}$$

Which can be simplified thanks to a Taylor first order approximation into :

$$u(w^*) = u(w) + (w^* - w)u'(w) \tag{5}$$

Substituting this into (2), we have

$$w = w^* + \frac{\phi}{1-\phi}.\frac{\pi - \pi^*}{n} \tag{6}$$

The equilibrium wage is determined by the reservation wage (i.e. the wage available outside the organized market), the relative bargaining strength of the two sides, and the excess of profit-per-employee (compared to the outside solution).

Employment is defined by referring to (3) :

$$n = \frac{\phi}{1-\phi}.\frac{\pi - \pi^*}{f'(n) - w} \tag{7}$$

The share of revenue accruing to labor for this representative firm is :

$$LS = \frac{w.n}{f(n)} \tag{8}$$

But equations (6) and (7) implies that w and n are decreasing in π^*. So we can assert that :

$$\frac{\partial LS}{\partial \pi^*} \leq 0 \tag{9}$$

The empirical implication of this model is that the bigger is capital mobility (i.e the higher is π^*), the lower will be the share of income payed to labor. Indeed, the higher is capital mobility, the lower is the cost of moving capital away (which increases π^*) and the higher is the prospect for profit outside (more possibilities of investment) which increases again π^*. This is a model where rents and profits (both factors are payed higher than their full competition level) exist and are shared between labor and capital. As exposed in the introduction, the profit is decreasing because of the increased global competition and mobility of capital. Consequently, this model predict that the bargaining over this profit will change at the expense of labor following the opening event.

Actually, the idea that a greater capital mobility and trade openness weakens workers bargaining position, and then labor share is quite common in the literature - see Rodrick (1998) and Harrison (2002). The hypothesis tested in this study is then that, all else equal, in countries with an organized labor market, the increased capital mobility implied by capital account liberalization policy will lead to a decrease of the labor share.

3.2 Classic model of capital accumulation

Some studies on the effects of increased capital openness on factor shares are based on the Heckscher-Ohlin framework and relax the factor immobility assumption like Guscina (2006) in order to adapt it. The results predicted by this model are quite clear: the Stolper-Samuelson theorem predicts that the owners of the abundant factor will gain from trade while the owners of the scarce factor will lose. The HO model therefore predicts that the relative reward of labour compared to that of capital should go up in labour-abundant countries and down in relatively labour-scarce countries. Replace labour scarce countries by developed countries and labour abundant countries by developing countries and the conclusion is that capital openness should lead toward a factor share equalization at the world level.

However it is not the case, Stockhammer (2013), among others, finds that globalization has the same effect on factor shares in developed and developing countries i.e. seems to lead the labor share toward a downward trend. Consequently, the Hecksher-Ohlin model and other trade models are maybe not the best way to modelize the opening of capital account in an economy. It makes even more sense if we believe that our effect goes through the differential bargaining between capital and labour and not an increased capital accumulation and reward in developed countries.

In a more classic and simple framework, we are able to modelize capital account opening with a standard production function. Given a CES production function in a closed economy:

$$Y = [\alpha K^{\sigma-1/\sigma} + (1-\alpha)L^{\sigma-1/\sigma}]^{\sigma/\sigma-1} \tag{10}$$

With Y the income of the country, K the capital, L labor, σ the elasticity of substitution between capital and labor and α a distribution parameter.

Assuming competitive markets, the two factors are payed to their marginal product, r being the price of capital and w the competitive wage. This is a difference with the first model, we assume there is no rents to bargain over.

$$w = (1-\alpha)(\frac{L}{Y})^{-1/\sigma} \quad and \quad r = \alpha(\frac{K}{Y})^{-1/\sigma} \tag{11}$$

The capital share S_k and the labor share S_l can be derived:

$$S_k = \alpha(\frac{K}{Y})^{1-1/\sigma} \quad and \quad S_l = 1 - S_k \tag{12}$$

From this, if we further assume than $\sigma \geq 1$, which is consistent with various papers, notably in Karabarbounis & Neiman (2003) which uses σ=1.25, then the labor share is a decreasing function of the capital output ratio. This is a big assumption as emphasized in Askenazy, Cette & Sylvain (2011), however recent papers seem to go that way. This classic result of labor share movement is highlighted in Bentolila & Saint-Paul (2003) among others.

Bentolila & Saint-Paul (2003) also explains that there are various reasons why the labour share can move from this path : non-neutralities in the aggregate production function, labour heterogeneity and difference between the real wage and the marginal product of labour.

Moving from closed to open capital market means that households and firms can now borrow and lend at the going rental rate r_w on the world capital market. We can safely assume that $r_w \leq r$. In the other hand, we assume that labour remains immobile.

From (11), we can then express the capital output ratio as an increasing function of the rental rate of capital.

$$\frac{K}{Y} = (\frac{r}{\alpha})^{-\sigma} \tag{13}$$

Thus, at the time of the opening of the economy to the world capital market, we should observe as the rental rate of capital goes from r to r_w a one-time increase of the capital output ratio and a one-time decrease of the labour share.

We could use it for computation: writing the change in rental rate between two arbitrary period t and t' as a function of the labour share, the distribution parameter α and the elasticity of substitution σ, then with the data we get on the labour share evolution and assumptions about α and σ, we could trace back evolution of rental rate r induced by the opening of capital account.

3.3 Labor share movement in financially dependent sectors

As mentioned above, the Rajan & Zingales aproach has never been used in the study of the decline of the labor share so we have no prior evidence or hints to know how financial dependence will interact with financial to impact labor share. Rajan & Zingales (1998) and even Gupta & Yuan (2009) find that liberalization increases growth particularly in industries heavily

dependent on external finance. In addition, Larrain (2015) finds that capital account opening increases the capital stock more in industries with high external financial dependence. It allows him to find that capital account opening increases wage inequality more in industries with high external financial dependence and with strong capital-skill complementarity. However, it is still unclear whether more financially dependent sector will see an bigger decrease of the labor share with capital openness or not as shown in the previous subsections.

Yet, we can provide the beginning of an answer: it rests on the characteristics of firms requiring more external finance. Opening the capital account allows financially constrained firms to access international financial markets and borrow capital from more capital-abundant countries. For technological reasons, firms in some industries require more external finance to produce output because they typically face higher fixed costs, and thus operate at larger scales of production. It follows that firms in these industries depend more on external financing and will be more financially constrained. As shown in previous subsections, both models developed in 3.1 and 3.2 predict that the opening of capital account will lead to a one time decrease of the labor share. But they have yet to make prediction regarding what happens if we include heterogeneity of sector.

In the case of the macroeconomic model developed in section 3.2, we can slightly alter the model in order to account for this heterogeneity. Let's consider two kinds of representative firm with two different way of accumulating capital : the firms which are not dependent to exterior finance which rent a share $1-\lambda$ of its capital through internal cash flow at a low price r_1 and a share λ through exterior finance at an higher price r_2. The firms which are dependent to exterior finance rent all their capital at the price r_2.

So according to (12) and (13), we can rewrite the capital share of those two representative firms :

$$S_k^1 = \frac{\lambda}{\alpha^\sigma r_2^{\sigma-1}} + \frac{1-\lambda}{\alpha^\sigma r_1^{\sigma-1}} \quad and \quad S_k^2 = \frac{1}{\alpha^\sigma r_2^{\sigma-1}} \tag{14}$$

The opening of capital account means that exterior rental rate of capital moves from r_2 to the lower r_2'. Because capital shares are decreasing function of the rental rate, the prediction of the section 3.2 is the same : the labor share will decrease for both types of firms. However, as we can see in (14), it will decrease in a greater scale for firms dependent to exterior finance.

In the other hand, extending the Nash bargaining model developed in section 3.1 could also help to shed a new light on this matter. In this model, we defined w* and π* which are worker and employer threat points. In particular, we said that w* was the wage determined in a fully competitive labor market with no rents. However, we are in a setting in which firms make their investment decisions before wage negotiation; so that workers have the possibility to capture a part of the immobile capital in order to take an advantage in the negotiation. That's the classic hold-up problem analyzed by Grout (1984) and further developed in the labor market by Malcomson (1997). Therefore, w* have two components : the first is the reservation wage (so the opportunity cost of time) let's say w_0 and the second one is an industry-specific component that depends on the nature of capital in the industry $w_0(K)$ i.e. to what extent this capital can be captured by the workers.

Following this, equation (6) can be rewritten :

$$w = w^* + \frac{\phi}{1-\phi}.\frac{\pi - \pi^*}{n} + \frac{\phi}{1-\phi}.w_0(K) \tag{15}$$

As consequence, according to equations (7) and (8), w, n and by extension the labor share LS are increasing functions of $w_0(K)$.

Cardullo et al. (2014) uses a sectorial measure of sunk capital intensity (one minus the share of used capital investment in total capital investment outlays at the industry level) recently proposed by Balasubramanian and Sivadasan (2009) which is invariant across countries and derived from US industry data to account for $w_0(K)$. Now, as firms needing more external finance operate at a larger scale and face higher fixed costs, they are also firms for which $w_0(K)$ will typically be higher. It means that according to our bargaining model, the capital account opening will have lesser negative effect on labor share for them than for firms with lower need in external finance. This prediction is the opposite of the model of section 3.2. The Rajan & Zingales approach has then two aims : provide further evidence of the existence of the effect observed at the country level and test which model's prediction is the right one. Because we think that our effect goes through an evolution of the bargaining over the rents in the labor market, we expect that the model in 3.1 is the right one.

4 Empirical methodologies

4.1 Country analysis

The first step of the analysis is to focus on the labour share decline at the country level. We look at the change in labor share before and after a country opens its capital account and compare it to the same change in countries not implementing reform during that period.

We use 3 different ways to proxy for capital openness, all using de jure measures, i.e. indexes that reflects administrative measures implementing capital openness.

1. Dates by country of financial liberalization from Kaminsky & Schmuckler (2013).

2. The Chinn & Ito index from Chinn & Ito (2006), another De jure measure of financial liberalization.

3. The Chinn & Ito index again but with the definition of a threshold above which a country is told to be liberalized. We chose to use a threshold of 0.8[7].

Using the Chinn & Ito index allow us to implement a standard OLS like in Jayadev (2007). In the other hand, dates of financial liberalization from Kaminsky & Schmuckler (2003) and the creation of a treatment dummy variable with the Chinn & Ito index direct toward a double difference strategy.

Implementing a conventional difference-in-difference approach is possible in our case. We are indeed comparing the average change over time in the labour share for countries that liberalized to the average change over time for countries that didnt. Different specifications include country fixed effects, which allows to exploit the within-country variation across time. It also includes year fixed effects to exploit the cross-country variation within a moment in time. The identification assumption is then that trends in labour share would be the same ceteris paribus for all liberalizing and non-liberalizing countries in the absence of capital account opening.

Looking at the evolution of labor share if we normalize the year of the financial reform in Kaminsky & Schmuckler (2003) to 0 for all countries seems

[7]We do not include in this specification the four countries whose accounts have been fully opened since the start of the period of interest: Germany, Netherlands, United States and Canada.

to go in our way. We observe a steeping trend after the reform, which justifies our double-difference strategy .

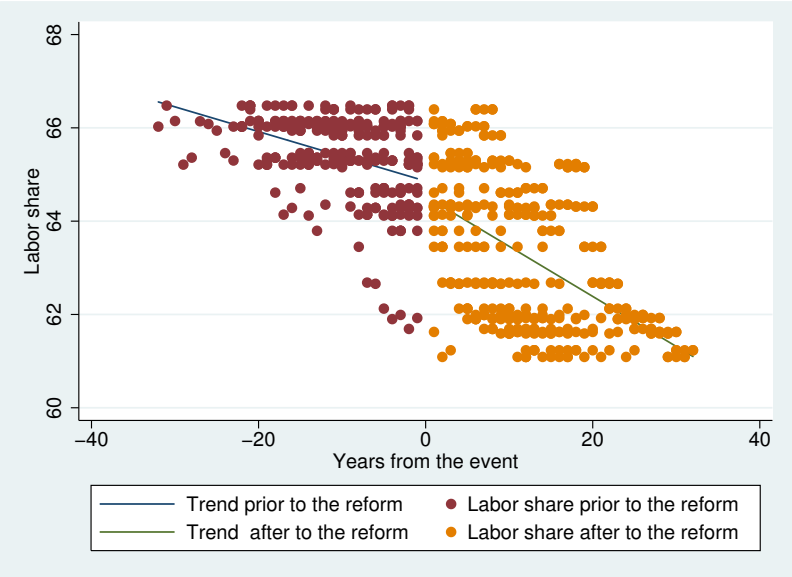

Figure 6: labor share trends before and after capital account opening

Given that we are studying OECD and developed countries and using country fixed effects, it is quite credible that we are looking at very comparable countries. Richer countries possess a constellation of social structures, regulations and institutional frameworks which make the bargaining theoretical argument developed earlier more plausible. By contrast, middle and low income countries possess significantly different labour market conditions. For example, in countries with per capita income even as high as U S 2,000/5,000 $ a year, social security and unemployment benefits are insignificant in term government expenses and in wages. It explains why Jayadev (2007) finds no effect of capital openness in those countries and also why some countries in our sample may be outliers like Cyprus or countries of east Europe.

In all cases, the equation of interest is the following :

$$LS_{ct} = \alpha + \beta Treated_{ct} + \Sigma_{j=1}^{n} \gamma_j X_{jct} + \delta_c + \delta_t + \epsilon_{ct} \tag{16}$$

With LS_{ct} the labor share of country c at time t

$Treated_ct$ is a dummy indicating whether the country opened its capital account or not or the Chinn & Ito index.

X_{jct} are the j controls at the country and time level.

δ_c and δ_t are country and time fixed effects.

The coefficient of interest is β, in this case it should be interpreted as follows : the opening of capital account of the country moved the labor share by β percentage points.

4.2 Control variables

There are lots of mechanisms which are contemporaneous or otherwise correlated with capital openness which may affect the labour share of income. We then need to control for them in our regressions.

First of all, capital account openness is correlated with the level of development, which in turn has strong effects on the labour share. In his classical work, Kuznets (1962) explains why wage income increase with development: increasing income provoke a movement of labour away from agriculture into a position of organized wage labour. Demographic changes and urbanization are also at stakes to explain this movement. Because we expect that labour share will rise with the level of development, we control it with the logarithm of GDP per capita at the country level.

Then, trade liberalization is also an important factor. As explained before, according to the Heckscher-Ohlin model, labour shares will rise in developing (labour abundant) countries and fall in developed (capital abundant) countries with trade integration. We criticized the use of the Heckscher-Ohlin model in the study of labor share movement but trade integration is still likely to lower labour share. We are then willing to control for it. To this extent, we reproduced the Rao (1998) methodology, i.e. we controlled for trade openness with the residuals we get from regressing trade ratio[8] to the logarithm of GDP and population. As a result, we have an indicator of trade openness obtained after purging the correlations between trade ratio and economic size.

Finally, Harrison (2002) finds that labour shares are partly driven by changes in government spending and government intervention in the economy in general. That's why we are also controlling for the government deficit of GDP extracted from the Penn World Table. Indeed, openness is said to subject governments to market discipline, and thus lowers its role in the economy. Consequently, to the extent that government expenditure in the

[8]Extracted from the World Development Indicators.

economy is constrained by openness, one would expect to see a fall in the labour share of income when government deficit decreases.

4.3 Other methodological issues

To begin with, estimated standard errors are likely to be serially correlated because of the labour share rigidity but also cross-country correlations. Indeed, labour share variations are likely to be auto-correlated within a country but also might be correlated between countries in a given time because of global unobserved determinants. For example, a future hypothetical European Commission Rulings on minimum wage could have a big influence on the labour share in most of countries in our sample. To solve this issue, we cluster standard errors for all of our regressions.

The most important concern is a possible selection bias. The difference-in-difference approach should ideally cancel out any global factors that are common to the treatment and control groups. Our set of controls should also account for specific characteristics of the treatment groups so that an omitted variable bias should not be an issue too.

But it doesn't erase any concerns. As shown in our first theoretical model, the existence of an organized labour market matters. In Brown et al. (2008), the authors finds that this kind of market is established thanks to the tacit settlement between organized labour and employers.

Until the early 1980's, the majority of large employers were entering into voluntary agreements with trade unions, not simply because unions had the bargaining power to make life difficult for them if they did not, but also because collective bargaining served the interests of employers. This was perceived to be a price worth paying if most or all competitors also paid collectively bargained rates.

But back in the 1980's, everything falls apart. The product markets became more competitive with several consequences: the profit on which trade unions could bargain over decreased while the bargaining power of trade unions decreased as well. This is pointing out a general trend toward a decreasing labour share in most developed countries. This kind of evolution is also institutional in the labour market, and could be happening simultaneously with capital account opening (as a part of an institutional package maybe) and then ought to be controlled for. We might imagine than such change happens before or might provoke capital account opening but we may only partially control for it.

The second empirical strategy which involves looking at inter sector variability will correct for this and should add greatly to the robustness of the potential effect we observed. Of course, there are other unobservables like trust in trade unions which could influence their bargaining power and that we cannot control for, however it should be only a problem in the OLS and not in the difference in difference approach[9].

Moreover, some of our concerns could be alleviated. The credibility of an endogeneity of liberalization is dubious. Indeed, if we expect that the liberalization decision is endogenous, we think that it would be because firms lobby the government to do so. But they have interest to lobby the government only if they expect the cost of labour to grow fast in the near future. So that if they want to substituate capital for labour, the opening up of capital will make it easier and less expensive. By extension, an increasing trend in labour share before opening of capital account could cause capital opening but at worse it would only bias our estimations in the wrong sense, causing us to underestimate our coefficient, especially considering that labour share is a stable measure. Moreover, as proven in P.B. Henry et al. (2009) there are no empirical proof of rising wages before the opening of capital account of liberalizing countries.

4.4 Sector analysis : A Rajan & Zingales approach

Our complementary strategy is to implement a difference-in-difference strategy in the way of Rajan & Zingales (1998). We rely here on the variation in dependence on external finance between sectors. The aim is then to use non-financially intensive sectors in a country as a control group for the financially intensive sectors in the same country.

Indeed, one of the important insight from Karabarbounis & Neiman (2013) is that the decline of the labour share is largely explained by the decline of the relative price of investment goods which leads to efficiency gains in capital producing sectors. Consequently, most of labour share variability comes from inter-sector characteristics. Moreover, we previously saw that we cannot hope to completely solve selection bias in our country analysis, so looking at intra-sector variability will do a lot to assert the robustness of our results. Indeed, the control group is more comparable (we compare

[9] A recent poll from IFOP demonstrated that in France between 2008 and 2012, the belief that the principle of free trade union was the most important republican value went down from 12% to 5%

sectors in the same country) than in the first part of our empirical strategy so that the internal validity should be much better.

However, a particular attention should be given, because this strategy involves identifying the effect of financial liberalization only from the differential effects across industries within a country and not the overall effect of capital account liberalization. In most of studies like Larrain (2015) or Levchenko, Ranciere and Thoenig (2007), this results in a bigger capital accumulation in financially dependent sectors. In conclusion, the Rajan & Zingales methodology can provide evidence that some sectors react to financial liberalization differently from others because of their higher sensitivity to capital openness. But it cannot distinguish between a case in which the effect on some sectors is zero while on others it is positive, and a case in which the effect on some sectors is zero while on others it is negative.

Here is the equation of interest:

$$LS_{ict} = \alpha + \beta_0 Treated_{ct} + \beta_1 Treated_{ct} * RZ_i + \Sigma_{j=1}^{n} \gamma_j X_{jict} + \delta_{ct} + \delta_{it} + \delta_{ic} + \epsilon_{ict} \tag{17}$$

With LS_{ict} the labor share of industry i in country c at year t

$Treated_{ct}$ is the treatment variable for country c at time t extracted from Kaminsky & Schmuckler (2003) or Chinn & Ito (2006).

RZ_i is the measure of financial dependence at the industry level which would be the original one from Rajan & Zingales (1998) or the one about liquidity needs by industry from Raddatz (2001) which we will introduce later.

X_{jict} are the j controls at the country, sector and time level.

δ_{ct}, δ_{it} and δ_{ic} are a set of fixed effects. We expect that in addition to our controls, many of the obvious differences which can arise between a treated country and sectors and its control, would be accounted for by this complete set of fixed effects. This specification includes a country-year fixed effects which allow to control for time-varying country characteristics. But also a country-industry fixed effects, which control for all country-varying industry characteristics and finally a sector-year fixed effects to alleviate the concern that the estimates are driven by global shocks affecting the labor share.

The coefficient of the interaction term β_1 should be interpreted in relation with β_0. When looking at the interaction between the Chinn & Ito index and the Rajan & Zingales measure, the interpretation is the following. A positive value for the coefficient of the interaction term would imply that the higher

is the vulnerability to exterior finance, the greater (more positive) the effect of capital openness on labour share is. When looking at the interaction between the dummy for treatment with Kaminsky & Schmuckler (2003) and the measure of vulnerability to exterior finance, it is a little different. It means that in more financially vulnerable sector in already opened countries, the openness had a positive effect on the labor share compared to non-financially vulnerable sectors.

5 Results, robustness checks and extensions

5.1 Results

The three columns of Table 5 correspond to the different ways defined above of measuring capital openness and present our results at the country level.

Column (1) corresponds to the difference in difference strategy implemented by putting a threshold with the Chinn & Ito index. Column (2) corresponds to the difference in difference strategy implemented using the liberalization dates from Kaminsky & Schmuckler. In those two cases, the coefficient of interest is fairly similar: negative and highly significant (at the 0.1 % percent level): the opening of capital account is predicted to decrease in average labour share by nearly two points of percentage. Column (3) corresponds to an OLS estimation using the Chinn & Ito index. We find that the estimated coefficient for the index is negative and significant: going from 0 to 1 in the index is predicted to decrease the labour share by 1.5 points of percentage. There are also proof that the coefficient of its square value is negative and significant though we did not reproduce the results of this estimation here. It brings evidence that capital openness has non-linear return. At the country level, it seems that early stages of capital opening do not decrease labour share maybe because it is coincidental to the development of organized labour market in small developed countries. It might also be explained by what finds P.B. Henry et al. (2009) on the impact of openness on wages in emerging countries. Anyway, we are able to measure a tipping point above which capital openness has a negative effect on labour share in this country analysis. By solving the 2nd order equation, we find that above a value of 0.35, the index has a negative impact. Such a low value of the index is not found in our sample but could typically be the one of a developing country.

Table 6 gives the estimations from our second estimation. Columns (1), (2) and (3) correspond to the Rajan & Zingales strategy implemented with the Chinn and Ito Index. We progressively included a broad range of fixed effects. The coefficient of the Chinn & Ito index is negative and significant for (2) and (3) but more importantly, coefficients of the interaction terms between capital openness index and financial dependence are positive and significant at the 1 % threshold in all cases. It means that financially vulnerable sectors experience a relatively lower decrease of their labour share and are less affected by capital openness. In order to have an idea of the amplitude of the effect, we consider an industry at the 75th percentile of the Rajan & Zingales index (0.36 like the Transportation equipment sector) and an industry at the 25th percentile (0.09 like the Iron & Steel sector). The differential effect across sectors of moving from 0 to 1 in the Chinn & Ito index on the labor share is 2.583(0.36-0.09)=3.49. Moving from 0 to 1 in the index increase the labor share by an additional 3.49 % in the industry at the 75th percentile of financial dependence compared to an industry at the 25th percentile. However, these coefficients are not high enough to completely cancel out the impact of the opening of capital account. Columns (4), (5) and (6) correspond to the Rajan & Zingales strategy implemented with the liberalization dates from Kaminsky & Schmuckler (2003). The coefficient of treatment is negative in (5) and (6) and significant in (5) while the coefficients of interaction terms are positive and significant in all cases. The differential effect across sectors of experiencing capital liberalization in the sense of Kaminsky & Schmuckler on the labor share is 6.376(0.36-0.09)=1.72. In both estimations, we have the proof that the negative impact of capital account liberalization on the labour share is somewhat tampered depending on the financial vulnerability of the sector.

As mentioned above, this effect might be explained by the fact that in more dependent to exterior finance sectors, firms invest more in immobile capital which could be captured by unions and workers. The "hold-up" problem, giving a significant advantage to the workers in the bargaining between capital and labor, leads the capital opening to have a lesser effect on the labour share. It seems also that the model developed in section 3.1 and 3.3 (which involves the existence of rents above which the bargaining is done) is the one which gives the better prediction regarding the evolution of the labor share in the event of the opening of capital account. It could be a hint at the fact that such model are more suited to describe the evolution of labor share in the event of financial liberalization.

5.2 Robustness checks

In addition to the previous estimations, we implement several robustness checks.

To begin with, the sector analysis is done with another index of financial vulnerability. This is the one from Raddatz (2006), which is an industry-level measure of liquidity needs which is also used in complement to the Rajan & Zingales index in Levchenko, Ranciere and Thoenig (2007). It corresponds to the value of inventories as a share of total sales, indeed when a sector has a higher need for liquidity, a smaller fraction of inventory accumulation can be financed by ongoing cash flow. It is another way to proxy for financial development at the sector level. Like in Rajan & Zingales (1998), the measure is built using U.S. data in the 80's and then extrapolated to other countries. The measure of the index for all sectors in the analysis can be found in Table 4 in the Appendix. The results in Table 7 in the Appendix are the same as in sector level estimations.

Then, we add several independent variables as controls. One is a measure of financial openness from Beck et al. (2001) in order to be sure that accounting for administrative measures of capital openness we do not simply measure trends in capital accumulation. Another is a measure of labour market rigidity from Jeffrey B Nugent & Nauro F. Campos (2009) which sums up and aggregates a lot of different indicators of labour market rigidity on a long period of time. If the theoretical model developed in section 3.1 is good then it should have an influence. Indeed, labour market rigidity should increase the cost of moving capital away. The addition of those controls do not change our main results.

Regarding the period of interest, we are looking at a quite extended period of time (35 years between 1970 and 2005). Given that the late 1990s have seen increasing capital account openness and diminishing labour shares, it may drive our result. That's why we tried to restrict our analysis to the period of 1975 - 1995 i.e. the period which concentrates reforms in our sample. We find similar results but no significance anymore as we do the country level analysis, maybe because of a lack of observations. In the meantime, the sector level analysis gives similar results to our main specification which seems to indicate that the lack of significance in the country level estimations is indeed driven by the lack of observations. We could also try to include the 60's but the data is scarce. However, even if we had the data, including this period would only strengthen our results, as it is a period of high capital

control and higher labour share.

In our original analysis, we dropped countries which were not found to be treated during the period. There are methodological reasons why their inclusion does not matter especially in the difference in difference approach. Moreover, most of them had only incomplete data for the Chinn & Ito index. They are small European countries or countries from east Europe: Estonia, Lithuania, Hungary, Czech Republic, Slovenia, Poland, Slovakia and Cyprus. We rerun our regressions including them, it does not change our main results but erase the significance of the Chinn & Ito index when used alone (it is understandable because of the nature of those countries especially regarding the nature of their organized labor market). Nevertheless, the results are similar to our initial strategy with the double difference strategy done with dates of financial liberalization from Kaminsky & Schmuckler (2003). It is a good robustness check because those countries are also countries with low labour share and high capital control so keeping the significance strengthen our results.

A final robustness check would be to use another way of measuring capital openness. In this analysis, we focused on De jure measures of capital openness. The advantage is that they reflect policy levers, and thus results based on them may have clearer policy implications for reforms that a government might consider. Their disadvantage is that they may capture quite poorly the actual degree of financial integration, either because the true nature of legal restrictions is mis-measured, or because these restrictions are imperfectly enforced. De facto measures do not have such flaws and that is why it is interesting to use them. Here, for this robustness check, we use a measure of gross foreign assets and liabilities from Lane and Milesi-Ferretti (2006) normalized by total GDP. Reproducing the same strategy at the country level with this index, we find also a negative and significant coefficient. The results of the regressions for all robustness check can be found in Table 9 and Table 10 at the country level and Table 12 at the sector level.

5.3 Heterogeneity of the effect according to type of labor

We extend our analysis to the study of the difference between the labour share of the high skilled and low skilled workers. In the EUKLEMS dataset, data by labour type is only available for employees, not self-employed. Furthermore,

we assume that the labour characteristics of self-employed and employees are the same within an industry. Consequently, our results are to be taken with caution. For most industries, deviations from this assumption will have a negligible effect but for industries with large number of self-employed like agriculture and retailing, this assumption might be more problematic. That's why like in our general analysis, looking at sector level data, we exclude those sectors from the analysis.

The distinction between low-skilled, high-skilled and medium skilled labour is relative to the country concerned. The table summing up the definition by country is available in the appendix in table 11[10].

Our variables of interest are computed multiplying the total labour compensation by the share of those compensation going to the high skilled workers or the low skilled ones and then dividing the total by the value added in the sector. We use the same indexes of capital openness as before and depending on the results, it might bring further evidence to support our narrative.

The results at the sector level can be found in Table 8 at the country level and Table 11 at the sector level in the appendix. Columns HS(1) and LS(1) corresponds to the double difference strategy implemented with the Chinn & Ito index with threshold but regressing only the high-skilled labor share and the low-skilled labor share. HS(2) and LS(2) to the double difference strategy with liberalization dates from Kaminsky & Schmuckler (2003) and HS(3) and LS(3) use the Chinn & Ito index in an OLS approach.

We find at the sector level that capital openness decrease the low-skilled labour share and has no effect on the high-skilled labour share (maybe even a positive one). It is quite coherent with the theory : Griliches (1969) brings evidence that capital is more substitutable for unskilled workers and more complementary to skilled workers. It means that in the issue of bargaining over the reduced rents, the high skilled workers might just profit from it.

To go further, since capital and skilled labor are more complementary as inputs than are capital and unskilled labor, liberalization increases the relative demand for skilled labor. There is one study in the literature that matters here :Larrain (2015) which studies the impact of capital account liberalization on wage inequalities between low-skilled and high-skilled labour. It exploits in the same Euklems dataset the variation in the timing of capital account reforms across 23 industrialized countries and finds that capital

[10]This table comes from the Euklems documentation

account liberalization policies increase the wage gap between skilled and unskilled labor by 4%.

In this extension, an interesting fact is that the heterogeneous effect cannot be explained by skill-biased technological change provoking a differential effect on the bargaining power according to the skill of the labour force. Technological progress could be a confounding factor only if the timing of technological change coincides with the timing of capital account liberalization. This is unlikely, since the timing of capital account reforms varies substantially across countries, while technological change behaves like a global trend. If this trend varies across industries, it will be captured by the industry-year fixed effects used in the second part of our empirical strategy.

6 Conclusion

Relatively little attention have been paid to the impacts of the change in capital mobility generated by financial liberalization on the rents going to labour. The objective of this master thesis was to fill this gap and also to provide hints on what could drive those effects. The empirical results we get suggest that there is a negative and significant impact of the opening of capital account on the labor share. Therefore, it seems that capital account openness is an important factor in the observed decline of labour share in many of the developed countries over the last 30 years. It accounts for nearly 2 percentage points decrease of the labour share. It means that the increased mobility of capital did negatively impact the bargaining power of labour.

We also find that the impact is heterogeneous according to different kinds of labour: skilled labour is not affected by capital openness while unskilled labour pays the entire price. The first kind which is typically complementary to capital does not lose and seems to keep its bargaining power intact. The former kind, which is typically substitutable to labour, is unable to keep up with the increased capital mobility. Part of this effect may also come from the differential mobility between the two kinds of labour. In addition, like Jayadev (2007), it is most likely, though they are not included in our sample, that the observed effect is not present in low income country mainly because the structural differences with the developed countries are also important determinants of the labor share, like for example the existence of an organized labour market. P.B.Henry et al. (2009) finds that in developing countries capital openness increase wages of unskilled labor, it could also explain this

result.

Moreover, there are strong theoretical reasons to believe in the negative impact of the opening of capital account on the labor share. Following a bargaining model, the increased mobility of capital provides a less costly outside option (threat point) in the bargaining game between the firm and the trade union. This will eventually negatively impact both wage and employment resulting in the decrease of the labour share. Following a more classic model, the opening of capital account also provokes a one-time increase of capital accumulation. Then, if we assume that the elasticity of substitution between capital and labour is bigger than 1, it will decrease the labour share as well.

Unfortunately, cross country panel analysis are often criticized to be littered with problems of data as well as generally deemed to be lacking in term of robustness. This master thesis aims to give interesting hints for further research about the impact of financial liberalization on the income distribution supported by rather secure methodologies. First of all, thanks to the use of the Euklems dataset, we ensure that data collection methodologies are consistent over time. Then, the various methodologies developed at the country level and completed by the more robust analysis at the sector level are also reasons why we should trust those results. Controlling for various processes, we ensure that the direct negative effect we observe at the country level is the residual of other determinants of the labour share. The sector level analysis in the way of Rajan & Zingales strengthen the robustness of the whole by showing that sectors which are more dependent to exterior finance are less impacted by the opening of capital account. It allows to test the theoretical underpinnings of our thesis : the effect we observe is incompatible with a capital accumulation model but rather shows that the right model was the bargaining one which rests on the existence of rents in the labor market. It also rules down a lot of possible concerns : for example that our different capital account openness variables are proxying for some other (unseen and immeasurable) institutional changes that would affect labour share because it is unlikely that those reforms would have interact with sector financial dependence in the same way.

However, this last concern is not totally ruled out. For example, it is conceivable that having liberalized, the state is constrained to act in favor of the interests of capital. If it is the case, then capital account liberalization policy is a signal for more profound changes which affect the bargaining power of labour. Moreover, we only partially looked at within-country differences focusing only on financial dependence and skilled-related labor share, so we

may only highlight a broad trend which only overshadows those differences. These two issues (the opening as a signal and within-country differences), that we couldn't completely solve here, give interesting possibilities for future research.

7 Bibliography

References

[1] Askenazy P., Cette G. & Sylvain A., 2011. Le Partage de la valeur ajoute, edition de La Dcouverte.

[2] Bassanini, A. and T. Manfredi, 2012. Capitals Grabbing Hand? A Cross-Country / Cross-Industry Analysis of the Decline of the Labour Share, OECD Social, Employment and Migration Working Papers no. 133, OECD Publishing

[3] Beck, T. Demirgucx-Kunt, A. and Levine, R., 2000. A new database on financial development and structure, World Bank Economic Review, September, 597605

[4] Bentolila, S., and G. Saint-Paul, 2003. Explaining Movements in the Labor Share, B.E. Journal of Macroeconomics, 3 .

[5] Blanchard, O., and F. Giavazzi, 2003. Macroeconomic Effects of Regulation And Deregulation In Goods and Labor Markets, Quarterly Journal of Economics, 118, 879907.

[6] Broner, Fernando, Didier, Tatiana, Erce, Aitor, and Schmukler, 2013. Gross Capital Flows: Dynamics and Crises, Journal of Monetary Economics 60(1), 113133.

[7] Brown W., Bryson A. and Forth J., 2008. Competition and the Retreat from Collective Bargaining, CWPE 0831.

[8] Campos, Nauro F & Nugent, Jeffrey B., 2012. "The Dynamics of the Regulation of Labor in Developing and Developed Countries since 1960', IZA Discussion Papers 6881, Institute for the Study of Labor (IZA).

[9] Cardullo G., Conti M. and Sulis G., 2014. Sunk Capital, Unions and the Hold-Up Problem: Theory and Evidence from Sectoral Data, University of Genova and Cagliari

[10] Chari A., Henry P.B., and Sasson D., 2012. Capital Market Integration and Wages, American Economic Journal: Economics, 4(2): 102-32

[11] Chinn, Menzie D., and Hiro Ito, 2008, A New Measure of Financial Openness, Journal of Comparative Policy Analysis, Vol. 10, No. 3, pp. 30922.

[12] Choi M., 2001. Threat Effect of Foreign Direct Investment on Labour Union Wage Premium, Political Economy Research Insititute Working Paper 2001

[13] Edison et al., 2004. Capital Account Liberalization and Economic Performance: Survey and Synthesis,IMF Staff Papers, Vol. 51, No. 2

[14] Gollin D., 2002. Getting Income Shares Right, Journal of Political Economy, 110 , 458474.

[15] Grout P.A., 1984. "Investment and wages in the absence of binding contracts: a nash bargaining approach," Econometrica, vol. 52 (2) , pp. 449460.

[16] Gupta, N. and Yuan, K., 2009. On the growth effect of stock market liberalizations, Review of Financial Studies.

[17] Guscina, A., 2006. Effects of Globalization on Labors Share in National Income, IMF Working Paper no. 294

[18] Harrison, A., 2002. Has Globalization Eroded Labors Share? Some Cross-Country Evidence, Working Paper, University of California at Berkeley

[19] Heckscher E. and B. Ohlin, 1933. Heckscher-Ohlin Trade Theory, translated and edited by Flam and Flanders (1991), Cambridge: MIT Press

[20] Jayadev A., 2007. Capital account openness and the labour share of income, Cambridge Journal of Economics

[21] Kaminsky, Graciela and Sergio Schmukler, 2003. Short-Run Pain, Long-Run Gain: The Effects of Financial Liberalization,IMF Working Paper 03/34.

[22] Karabarbounis, L., and B. Neiman, 2014. The global decline of the labor share, The Quarterly Journal of Economics The Quarterly Journal of Economics

[23] Kuznets, S., 1966. Modern Economic Growth. Rate, Structure, and Spread New Haven, CT Yale University Press

[24] Lane, Philip, and Gian Maria Milesi-Ferretti, 2006. The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970-2004, IMF Working Paper, 06/69.

[25] Larrain M., 2015. Capital account liberalization and wage inequality, Review of Financial Studies (forthcoming).

[26] Lee, K. and Jayadev, A., 2003. A New Index of Capital Account Openness, mimeo, University of Massachusetts, Amherst

[27] Malcomson, J. M., 1997. "Contracts, hold-up, and labor markets," Journal of Economic Literature, vol. 35, pp.1916-1957.

[28] Quinn, D. P., 1997. The correlates of changes in international financial regulation, American Political Science Review, vol. 91, 53151.

[29] Raddatz, Claudio, 2006. Liquidity Needs and Vulnerability to Financial Underdevel- opment,Journal of Financial Economics, 80, 677-722.

[30] Rajan, Raghuram, and Luigi Zingales, 1998. "Financial Dependence and Growth," American Economic Review, 88(3), 559-86.

[31] Levchenko A., Ranciere R., and Thoenig M., 2007. Conference on New Perspectives on Financial Globalization, IMF

[32] Rao, J. M., 1998. Globalization and the Fiscal Autonomy of the State, Human Development Report Background Papers Vol. 1, 32760

[33] Rodrik, D., 1998. Who needs capital-account convertibility?, Essays in International Finance no. 207, Princeton, NJ., Princeton University Press

[34] Rodrik, D., 1997. Has Globalization Gone too Far?, Institute for International Economics

[35] Stockhammer, 2013. Why have wage shares fallen? A panel analysis of the determinants of functional income distribution, ILO, Conditions of Work and Employment Series No. 35

A Indexes

ISIC Code	Industry	External dependence
311	Food Products	0.14
313	Beverages	0.08
314	Tobacco	-0.45
321	Textile	0.19
322	Apparel	0.03
323	Leather	-0.14
324	Footwear	-0.08
331	Woods product	0.28
332	Furniture	0.24
341	Paper and products	0.17
342	Printing and publishing	0.20
351	Industrial chemicals	0.25
352	Other chemicals	0.75
353	Petroleum refineries	0.04
354	Petroleum and coal products	0.33
355	Rubber products	0.23
356	Plastic products	1.14
361	Pottery	-0.15
362	Glass	0.53
369	Non metal products	0.06
371	Iron and steel	0.09
372	Non ferrous metal	0.01
381	Metal products	0.24
382	Machinery	0.60
383	Electric machinery	0.95
384	Transportation equipment	0.36
385	Professional goods	0.96
390	Other industry	0.47

Table 3: External dependance according to industry from Rajan & Zingales(1998)

ISIC Code	Industry	External dependence
311	Food Products	0.11
313	Beverages	0.09
314	Tobacco	0.24
321	Textile	0.16
322	Apparel	0.20
323	Leather	0.27
324	Footwear	0.22
331	Woods product	0.13
332	Furniture	0.16
341	Paper and products	0.11
342	Printing and publishing	0.08
351	Industrial chemicals	0.13
352	Other chemicals	0.15
353	Petroleum refineries	0.06
354	Petroleum and coal products	0.15
355	Rubber products	0.14
356	Plastic products	0.14
361	Pottery	0.17
362	Glass	0.16
369	Non metal products	0.15
371	Iron and steel	0.16
372	Non ferrous metal	0.15
381	Metal products	0.18
382	Machinery	0.21
383	Electric machinery	0.21
384	Transportation equipment	0.15
385	Professional goods	0.22
390	Other industry	0.21

Table 4: Measure of liquidity needs according to industry from Raddatz (2006)

B Results of standard estimations

Table 5: Three estimations at the country level

	(1)	(2)	(3)
Capital account opening	-1.810***	-1.768***	-1.684*
	(-4.56)	(-4.17)	(-2.28)
Logarithm of GDP	9.612***	2.842*	3.665**
	(4.93)	(2.29)	(3.08)
Government deficit	1.159***	0.876***	1.119***
	(6.87)	(4.10)	(6.07)
Trade openness	-0.0645***	-0.0616***	-0.0412**
	(-3.72)	(-3.94)	(-2.66)
Country fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
Observations	549	441	579
R^2	0.821	0.787	0.802

Notes: The table reports the estimates of the effect of capital account opening on the labor share at the country level. Column (1) uses the Chinn & Ito (2006) index with a threshold to define opening episode in a Difference in Difference framework. Column (2) uses Liberalization dates from Kaminsky & Schmuckler (2003) in the same way. Column (3) use the original Chinn & Ito index in an OLS approach.
t statistics in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Sector level estimations(Rajan & Zingales approach)

	(1)	(2)	(3)	(4)	(5)	(6)
Capital account opening	-4.434	-15.03***	-18.69**	0.804	-11.65***	-2.872
	(-0.51)	(-3.66)	(-2.64)	(0.08)	(-3.74)	(-1.24)
Capital account opening*Financial dependence	11.19***	14.17***	12.93***	5.488***	5.491***	6.376***
	(5.55)	(7.19)	(5.36)	(4.58)	(4.74)	(5.45)
Logarithm of GDP	1.169	9.467**	-1.143	0.0989	10.31**	-4.336
	(0.43)	(3.03)	(-0.58)	(0.03)	(3.13)	(-1.86)
Government deficit	5.529***	5.381***	1.343	5.620***	5.041***	-3.366**
	(5.11)	(4.67)	(1.47)	(5.07)	(4.53)	(-4.44)
Trade openness	0.0468	0.0544	-0.141*	0.0834	-0.0273	-0.428**
	(0.57)	(1.65)	(-1.97)	(0.70)	(-0.49)	(-5.86)
Country-year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effect	No	Yes	Yes	No	Yes	Yes
Country-Industry fixed effect	No	No	Yes	No	No	Yes
Observations	7933	7933	7933	7975	7975	7975
R^2	0.181	0.612	0.841	0.181	0.610	0.840

Notes: The table reports the estimates of the effect of capital account opening on the labor share at the sector level. Columns (1), (2) and (3) use the Chinn & Ito (2006) index in an OLS framework with progressive introduction of a complete set of fixed effects. Columns (4), (5) and (6) use Liberalization dates from Kaminsky & Schmuckler (2003) in a dfference in difference framework with progressive use of fixed effects as well. t statistics in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Sector level estimations (Rajan & Zingales approach: Raddatz index)

	(1)	(2)
Capital account opening	3.279	0.660
	(0.38)	(0.38)
Capital account opening*Liquidity needs	25.49***	9.813***
	(6.72)	(5.28)
Logarithm of GDP	-7.780*	-4.740***
	(-2.37)	(-3.72)
Government deficit	-1.260	-2.877***
	(-1.46)	(-4.58)
Trade openness	-0.120*	-0.123
	(-2.18)	(-1.60)
Country-year fixed effect	Yes	Yes
Industry-year fixed effect	Yes	Yes
Country-industry fixed effect	Yes	Yes
Observations	7933	7975
R^2	0.841	0.840

Notes: The table reports the estimates of the effect of capital account opening on the labor share at the sector level using the Raddatz index instead of the Rajan & Zingales one. Column (1) use the Chinn & Ito (2006) index in an OLS framework. Column (2) use Liberalization dates from Kaminsky & Schmuckler (2003) in a difference in difference framework.

t statistics in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

C Robustness checks

Table 8: Effect of the opening of capital account on high skilled and low skilled labor shares

	HS(1)	LS(1)	HS(2)	LS(2)	HS(3)	LS(3)
Capital account opening	-0.904***	-1.941***	-0.584*	0.206	-2.890***	-0.648
	(-3.98)	(-5.59)	(-2.10)	(0.50)	(-6.76)	(-0.61)
Logarithm of GDP	-1.518	-7.503***	-1.263	-7.485***	-1.204	-7.314***
	(-1.82)	(-8.76)	(-1.37)	(-8.22)	(-1.47)	(-8.42)
Government deficit	-0.0411	-1.193***	-0.0736	-1.362***	0.0324	-1.310***
	(-0.25)	(-5.24)	(-0.42)	(-5.48)	(0.20)	(-5.66)
Trade openness	-0.0269**	-0.0254	-0.0335***	-0.0338*	-0.0249**	-0.0337*
	(-2.89)	(-1.51)	(-3.61)	(-2.11)	(-2.76)	(-1.98)
Observations	439	439	439	439	437	437
R^2	0.967	0.956	0.966	0.954	0.970	0.954

Notes: This table reports the estimates of the effect of capital account opening on the labor share at the country level of low-skilled and the high skilled labor share. Columns (1) use the Chinn & Ito (2006) index with a threshold to define opening episode in a Difference in Difference framework. Columns (2) use liberalization dates from Kaminsky & Schmuckler (2003) in the same way. Finally, columns (3) use the original Chinn & Ito index in an OLS.

t statistics in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: Robustness checks (1)

	(1)	(2)	(3)	(4)
Capital account opening	-0.192	-1.869***	-0.658	0.0297
	(-0.25)	(-4.09)	(-1.44)	(0.03)
Total liabilities over GDP	-0.0181	-0.00469		
	(-1.59)	(-0.41)		
Labor market rigidity	0.158	-0.715		
	(0.37)	(-1.57)		
Logarithm of GDP	4.688***	4.148**	11.44***	10.18***
	(4.13)	(3.25)	(5.97)	(6.25)
Government deficit	1.168***	1.078***	1.168***	1.236***
	(6.71)	(4.62)	(4.19)	(4.96)
Trade openness	-0.0319*	-0.0492**	0.0853*	0.0349
	(-2.26)	(-2.80)	(2.57)	(1.31)
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Observations	629	422	252	335
R^2	0.851	0.795	0.849	0.852

Notes: This table gives the estimates for our robustness checks. Column (1) gives the estimate of the OLS using the Chinn & Ito index with new controls defined in section 5.2. Column (2) of the fifference in difference estimation using Liberalization dates from Kaminsky & Schmuckler (2003) with new controls. Column (3) gives the estimate of the OLS using the Chinn & Ito index restricting the time period to 1975-1995. Column (4) of the Difference in difference estimation using Liberalization dates from Kaminsky & Schmuckler (2003) restricting the time period to 1975-1995.
t statistics in parentheses $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Table 10: Robustness checks (2)

	(5)	(6)	(7)
Capital account opening	-1.247	-0.898*	-0.492**
	(-1.80)	(-2.46)	(-2.76)
Logarithm of GDP	3.387**	3.258**	3.392**
	(3.00)	(2.80)	(3.15)
Government deficit	1.032***	0.878***	0.726***
	(6.11)	(4.87)	(4.19)
Trade openness	-0.0432**	-0.0566***	-0.0365*
	(-3.28)	(-4.40)	(-2.56)
Country fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
Observations	654	665	662
R^2	0.846	0.847	0.851

Notes: Column (5) gives the estimate of the OLS using the Chinn & Ito index introducing countries previously dropped from the sample. Column (6) of the difference in difference estimation using liberalization dates from Kaminsky & Schmuckler (2003) introducing countries previously dropped from the sample. Finally, column (7) reproduces the country level OLS using the de facto index of capital openness from Lane & Ferretti (2006). t statistics in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11: Effect of the opening of capital account on high skilled and low-skilled labor shares (Rajan & Zingales approach)

	HS(1)	LS(1)	HS(2)	LS(2)
Capital account opening	3.585*	-10.12***	0.868	-3.492*
	(2.00)	(-4.06)	(1.03)	(-2.02)
Capital account opening*Financial dependence	-2.646**	-3.310*	-0.0985	-2.422***
	(-3.03)	(-2.46)	(-0.23)	(-3.75)
Logarithm of GDP	-1.093	-16.81***	-1.339	-9.388***
	(-1.11)	(-9.28)	(-1.64)	(-5.69)
Government deficit	-1.191***	-2.780***	-1.718***	-2.971***
	(-3.49)	(-4.58)	(-5.40)	(-5.13)
Trade openness	-0.0901***	-0.249***	-0.167***	-0.157**
	(-4.79)	(-7.11)	(-5.05)	(-3.06)
Country-Year fixed effect	Yes	Yes	Yes	Yes
Industry-year fixed effect	Yes	Yes	Yes	Yes
Country-Industry fixed effect	Yes	Yes	Yes	Yes
Observations	7836	7836	7933	7933
R^2	0.959	0.966	0.959	0.966

Notes: This table presents the estimate at the sector level of our strategy. Columns HS(1) and LS(1) use the original Chinn & Ito index and interact it with the measure of financial dependence of Rajan & Zingales(1998) to estimate the change in high-skilled and low-skilled labor share. Columns HS(2) and LS(2) use the dates from Kaminsky & Schmuckler (2003) in the classic difference in difference approach of Rajan & Zingales (1998). t statistics in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 12: Robustness checks (Sector level)

	(1)	(2)	(3)	(4)
Capital account opening	-6.058	-15.26***	-13.40*	7.701*
	(-1.00)	(-3.96)	(-2.53)	(2.19)
Capital account opening*Financial dependence	12.62***	5.671***	18.55***	4.591***
	(5.14)	(4.53)	(5.31)	(3.44)
Total liabilities over GDP	0.0267	0.170**	0.302***	-0.0530
	(0.52)	(2.58)	(5.03)	(-0.82)
Labor market rigidity	0.446***	0.185	-0.246**	0.0576
	(4.15)	(1.83)	(-2.82)	(0.67)
Logarithm of GDP	0.695	7.835***	-7.676**	-22.48***
	(0.26)	(3.46)	(-2.70)	(-7.55)
Government deficit	4.981***	3.346***	7.130***	-3.732***
	(4.86)	(4.77)	(9.28)	(-4.35)
Trade openness	-0.0813	0.0523	-0.401***	0.0209
	(-1.18)	(0.66)	(-7.43)	(0.34)
Country-Year fixed effect	Yes	Yes	Yes	Yes
Industry-year fixed effect	Yes	Yes	Yes	Yes
Country-Industry fixed effect	Yes	Yes	Yes	Yes
Observations	7491	6231	4388	3695
R^2	0.841	0.848	0.893	0.900

Notes: This table presents our robustness checks at the sector level. Column (1) reproduces the results of the sector level estimation using the Chinn & Ito index and introducing new controls. Column (2) reproduces the results of the sector level estimation using dates from Kaminsky & Schmuckler (2003) and introducing new controls. Columns (3) and (4) are the same but on a reduced period of time : 1975-1995. t statistics in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	Definition of High-skilled	Definition of Medium-skilled	Definition of Low-skilled
AUT	College/university degree, technical/poly-technical degree, postgraduate courses	Vocational middle schools, completed upper level of Gymnasium, vocational higher schools	Primary education
BEL	University and non-university 2 cycles tertiary education	Higher/upper secondary education and non-university 1 cycle tertiary education	All people up to lower secondary education
CYP	n.a.	n.a.	n.a.
CZE	University	Higher post-secondary, Secondary with GCE, Apprenticeship and persons with unknown education	Lower secondary and primary education
DEW	16-17 years of education	vocational degree	without degree
DNK	Long cycle higher education	Medium and Short cycle higher education plus Vocational education and training	Basic School
ESP	University graduates	Upper secondary schooling	Lower secondary schooling and below
EST	n.a.	n.a.	n.a.
FIN	Tertiary schooling (or parts there of)	Upper secondary level with or without matriculation	lower secondary or unknown
FRA	University graduates	Higher education below degree, Low intermediate, vocational education	No formal qualifications
GBR	University degree	HND, HNC, BTEC, teaching qualification, nursing qualification, A level or equivalent, trade apprenticeship, O level or equivalent, BTEC, BEC, TEC GENERAL, City & guilds	No qualifications
GER	University graduates	Intermediate	No formal qualifications
GRC	n.a.	n.a.	n.a.
HUN	Tertiary education (ISCED groups 5-6)	At most upper secondary education (ISCED groups 3-4, excl. 3c programmes shorter than 3 years)	At most lower secondary education (ISCED groups 0-2 & 3c programmes shorter than 3 years)
IRL	n.a.	n.a.	n.a.
ITA	University graduates	Higher education below degree, Intermediate vocational plus advanced education, Low intermediate	No formal qualifications
JAP	University graduates	Junior College and Upper Secondary	Lower Secondary
LVA	n.a.	n.a.	n.a.
LTU	n.a.	n.a.	n.a.
LUX	n.a.	n.a.	n.a.
MLT	n.a.	n.a.	n.a.
NLD	University degree and Higher vocational	Intermediate vocational plus advanced education and Low intermediate	No formal qualifications (Basis onderwijs)
POL	Doctor and master's degree, bachelor degree or any other degree of equal status	Post secondary, vocational secondary and basic secondary levels	At most lower secondary education (ISCED groups 0-2 & 3c programmes shorter than 3 years)
PRT	n.a.	n.a.	n.a.
SVK	PhD, master's and bachelors degree	Higher professional education, secondary general, vocational and specialised education with and without matura, persons without information on educational attainment level	Basic education
SVN	University & non-university colleges	Vocational secondary school degrees 2-5, vocational school for highly skilled workers and other secondary schools	Vocational secondary school degrees 1, primary school, 1 to 7 primary school grades and no schooling
SWE	Postgraduates and Undergraduates	Higher and intermediate vocational	Intermediate education and No formal qualifications
USA NAICS	n.a.	n.a.	n.a.
USA SIC	College graduate and above	High school and some years of college (but not completed)	Less then high school and some years of high school (but not completed)

Table 13: Definition of low, medium and high skilled Labour according to the Euklems dataset