Wage-led or Profit-led Economic Growth: The Case of Chile 1996-2017

Thesis submitted in fulfillment of the requirements for the degree of Master in Economic Analysis

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Abstract

The main objective of this work is to estimate the effects of income redistribution on economic growth in Chile with a post-Kaleckian/post-Keynesian approach. We analyze the period between 1996-2017, identifying the effect of an increase in the profit share on aggregate demand. We seek to highlight the "forgotten" role of wages as a source of demand and try to understand the macroeconomic effects of inequality such as its impact on achieving long-term economic growth.

Our main results show that an increase of 1%-point in the profit share will lead to a contraction of 0.44% in aggregate demand, which indicates that Chilean economic growth is wage-led. Furthermore, we use an innovative approach by testing whether economic growth is wage-led or profit-led. Allowing for possible transformations from one regime to the other over the period analyzed. The conclusions are that for a significant part of the period, economic growth in Chile was wage-led. Which means that in such period an increase in the wage rate would cause faster economic growth. In other words, improving income distribution would be consistent with faster economic growth.

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Introduction

Inequality is often not considered an important variable in neoclassical theory. In fact, neoclassical theory assumes that inequality is the outcome of the productivity and relative abundance of capital and labor. Economic orthodoxy assumes that long-run economic growth is based merely on supply factors including the factor productivity growth and growth in capital stock, which neglects to consider aggregate demand (Lavoie, 2009; Keynes, 2014). The assumption of Says' law[1] by mainstream economists has overestimated the impact of supply factors on economic growth and distribution. Yet if Say's law is not a credible representation of capitalist economies, then: how does aggregate demand determine the product? And, why does inequality become paramount when it comes to determine production and its expansion?

We can find the answer in the theoretical framework developed by post-Keynesians and post-Kaleckian economists who formally identified a relationship between inequality and economic growth (Barbosa-Filho & Taylor, 2006; Bhaduri & Marglin, 1990; Blecker, 1989; Dutt 198; Rowthorn 1981; Stockhammer & Stehrer, 2011). If aggregate demand is an important factor in determining output, then its composition is fundamental. Accordingly, as inequality is an essential factor that shapes aggregate demand, so too inequality is an important factor to consider in the determination of output. Following the work of post-Keynesians/post-Kaleckian economists, we study inequality through the functional distribution of income, which is known as the pay for each factor of production. In other words, we study the total amount of wages, salaries and profits. The latter is composed of different kinds of incomes including interest payments, depreciation, undistributed earnings, dividends, rents and cash withdrawals (Kalecki, 1954). We choose this approach towards inequality because the income of each social class (capitalists/workers) is transformed into demand and consequently into production. For this analysis, we consider that inequality is the outcome of a complex political and institutional framework that depends on the role of the state and the conflict between social classes (Rodriguez, 2014). Therefore, inequality is an exogenous variable in our model.

The impact of inequality on aggregate demand is given by each of its components: (1) Aggregate consumption depends on the income of both social classes and in their marginal propensities to consume. If the marginal propensity to consume out of wages is larger than the marginal propensity to consume out of profits, then an increase in real wages will increase aggregate consumption. (2) Investment will depend positively on the profit share and on the actual aggregate demand i.e. the accelerator of investment[2]. (3) Net exports are defined as the difference between exports and imports: the former will depend negatively on export prices, that will eventually increase with the costs of production (wages) and it will decrease international competitiveness; and the latter will depend on the income of both social classes, and in the income elasticity of imports. (4) We assume that government expenditure does not depend on the functional distribution of income (Lavoie & Stockhammer, 2013). Then a redistribution of income will have an ambiguous effect on aggregate demand, being determined by each of its components and this excess of aggregate demand will have effects on final growth due to the effect of the multiplier

[1] We understand Say's law in the sense that "the whole of the costs of production must necessarily be spent in the aggregate, directly or indirectly, on purchasing the product" (Keynes, 1936, p.50).

[2] As the capitalist economies do not produce at full capacity, there is a ratio of utilization that will increase if the current demand is greater than the expected one, and it will encourage the investment of capital in order to achieve the "normal" rate of utilization.

and in the effect on the degree of capacity utilization.

The empirical literature about distribution and economic growth had been mainly focused on developed countries originating an empirical vacuum in developing countries, especially in Latin America. Most of the studies had shown that the majority of countries of the Euro Area and members of the OECD (including USA) have wage-led demand regimes (Hein & Vogel, 2007; Onaran & Obst, 2016; Pérez & Vernengo, 2013; Stockhammer & Onaran, 2012; Stockhammer, Onaran & Ederer, 2008), highlighting the role of a simultaneous decrease in the wage share in the economic performance of this countries, explaining the relatively low economic growth since 1980.

On the other hand, Onaran & Galanis (2012) estimated the effect of a change in the wage share on growth in the G20 group. They verified the previous results that found most Euro Area countries and the United States are in wage-led regimes. Additionally, they contribute estimations for the first time for a considerable group of developing countries, including Turkey, Korea, Mexico, Argentina, India, China and South Africa. In the case of Argentina and Mexico, the research indicates that both economies are in profit-led regimes in the period 1970-2008 due to the loss of international competitiveness that would cause higher wages. In the Brazilian case the relationship between distribution and growth had been a research topic for a long time (de Jesus, Araujo & Drumond, 2018). Yet, the empirical literature is ambiguous in determining if Brazil economic growth is wage or profit-led.

Germán Alarco (2014) presents a study in order to exhibit the relationship between the functional income distribution and growth in Latin America between 1950 and 2011. With a Granger Causality test, he rejects the hypothesis that GDP determines the wage share for most Latin American countries (eight of fifteen) including Chile, which means that the functional income redistribution has effects on the economic performance of these countries. Additionally, it exhibits breaks in the relationship between the wage share and GDP after the debt crisis in 1980. In fact, at regional level there was a strong and positive correlation between the wage share in GDP (in percentage variations) until 1980 after which the links are weaker.

This paper provides the first empirical research about the impacts of income redistribution in Chile under a Post-Keynesian/Kaleckian model. Additionally, we use an eclectic approach in the sense that we compute our estimation with a more precise definition of the wage share, excluding the wage bill of managers, executives, and CEO's, which has a crucial role in the determination of profits (Lavoie, 2009). The theoretical literature has stressed the importance of the top-income workers in the functional income distribution in the sense that considering them in the wage share could lead to an underestimation of inequality (Stockhammer, 2013). On the other hand, the literature exhibits the positive role of the managerial wage bill in the profitability of the firms under certain conditions (Lavoie, 2009). Not excluding the managerial wage bill could lead to an underestimation of the marginal propensity to consume out of wages, being more probably a profit-led regime.

Unlike the main orthodox approaches, our methodology evaluates for structural breaks in our estimations and we re-estimate our regressions in sub-periods to allow for possible changes from one regime to the other over the period analyzed. Mainstream approaches do not consider the possibility of changing from one regime to another because they consider the relationship between variables to remain stable over time. Our approach is more flexible allowing us to find if

an increase in the wage bill will cause higher economic growth or not across specific sub-periods. Being possible that exists conditions where higher profits are consistent with faster economic growth as the Neoclassical and Neo-Keynesian theories predict.

This paper starts exhibiting the relationship between inequality and economic growth, explaining under which circumstances more equality is compatible with faster economic growth and vice versa. The second section presents the wage share estimation discounting the managerial wage bill, highlighting the medium-term evolution of the wage/profit share. The third section presents the estimation methodology and the empirical results of the model. The fourth section takes into consideration structural breaks in the empirical results and section five concludes and derives policy implications.

Economic structure and economic regime

One of the most important contributions of Bhaduri and Marglin' seminal work (1990) is that the Keynesian theory has a wide theoretical and political range. In which several combinations of economic policies and outcomes fit into the Keynesian theoretical scheme. These results vary depending on whether we start the economic analysis in a scenario of unemployment of capital and labor or full-employment. If there is excess capacity, then there would be the potential for aggregate demand to push economic growth. On the other hand, if there is full employment of labor and capital, then supply needs to increase for growth (Rowthorn, 1981). The policies for economic growth do not have the same effect depending of the degree of employment of factors (Lavoie, 2014). In his most recent work, Ricardo Ffrench-Davis (2018) advocates that since the slowdown of the Chilean economy in 2013, there has been a significant output gap for the period 2014-2017 which rises to a 4,2% of potential output. This means that there is space for demand shocks to reactivate economic growth.

Within the scenario of unemployment of capital and labor and following the literature of the Post-Keynesian models of growth, we can differentiate between two regimes based on how aggregate demand reacts to changes in income distribution (Bhaduri & Marglin, 1990). If an increase in the wage share leads to an increase in the aggregate demand, then the economy is in a wage-led regime. This scenario arises when the marginal propensities to consume of both social classes are considerably different, and the negative effect of higher wages on investment and net exports are relatively smaller. On the other hand, if an increase in the wage share leads to a decrease in aggregate demand, then an economy is in a profit-led regime (for summary see Table 1). A profit-led regime arises if the investment is highly sensitive to profits or if the effects of higher wages are translated into higher export prices, causing a reduction in international competitiveness.

Much of the empirical literature demonstrates that in small open economies the net exports are very sensitive to profits (Onaran & Galanis, 2012), which could indicate that Chile is in a profit-led regime by its level of commercial openness. But the composition of aggregate demand in Chile is peculiar, since the total private consumption represents more than the 60% of the aggregate demand. And if we observe the decomposition of the consumption by kind of goods/services we observe that the consumption of services and non-durable goods represents

93% of total private consumption (43% and 50% respectively) which represents 57% of the total aggregate demand being this type of goods produced mainly by national firms, which can outweigh the negative effect on international trade.

Table 1: Definition of profit-led and wage-led regimes

		Overall impact on aggregate demand	
		Expansionary	Contractionary
Income distribution change	An increase in the profit share	Profit-led regime	Wage-led regime
	An increase in the wage share	Wage-led regime	Profit-led regime

Source: table extracted from Stockhammer, 2011.

Income redistribution's impact on aggregate demand will determine if we are in presence of a profit or wage-led regime. Nevertheless, economic regimes may not be a permanent feature of a country. If the economy is a permanent wage-led regime, a constant increase in real wages will always encourage the aggregate demand and production. If the main features of an economic structure (for summary see Table 2) remain stable after a redistribution of income, then the economic regime may be considered "steady." However, if these main characteristics change, due to the same process of redistribution or due to an exogenous shock, then there could be a weakening of the economic regime or a shift of regime. And the economic/social policies implemented before the change of regime could have the opposite effect (in relation to the expected effect) on economic growth.

In a wage-led regime the foremost features that will change are: the marginal propensities to consume out of wages, due to the Keynesian argument that explains that an increase in wealth reduces the marginal propensity to consume (Keynes, 2014); then, there could be a specific wage share where the marginal propensity to consume decreases and the positive effect of redistribution becomes smaller. Additionally, the effect of the accelerator could become smaller, due to the fact that there could be a "minimal" profit share and any reduction from that point would decrease the amount of total investment. As a consequence, the effect of the investment's accelerator would be suspended regardless of demand's growth.

This phenomenon could explain the economic process of the Unidad Popular (UP) in Chile. The process of utilization of the degree of capacity due to the expansion of aggregate demand did not cause an increase of investment, even though the GDP grew more than 10% in 1971, given that the investment was dominated by the profitability (or more precisely, uncertainty) and not by demand. The fast decrease in the rate of utilization with a higher expansion of aggregate demand, relatively to production, should cause inflation. The economic experience of the UP is a clear example in which the application of the same politics when the economic structure changes, brought macroeconomics imbalances and lower economic growth.

The role of investment is fundamental for both regimes because it determines the expansion of the potential output in an economy. There is the possibility to encounter the case of an

Table 2: Economic structure: wage-led and profit-led demand regimes

	Demand regime	
	Profit-led	Wage-led
Economic Structucture	Small differentials in propensities to consume	Propensity to consume out of wages is considerable higher than the propensity to consume out of profits
	Investment is highly sensitive to profits	Investment is non-sensitive to profits
	The effect of accelerator is low	The accelerator effect is high
	Very open economy	Relatively closed economy
	High export price elasticity	Low export price elasticity
	High import price elasticity	Low import price elasticity
	High import income elasticity	Low import income elasticity
	Low excess capacity	High excess capacity
	Low rates of profits	High rates of profits
Other factors	Fiscal and monetary policies	
	Financial development	
	Changes in world demand and exchange rate	
	Commodity prices	

Source: table extracted from Lavoie & Stockhammer, 2013.

economy that its demand is wage-led, but its investment is highly sensitive to profitability and this could lead to a scenario of economic stagnation (Bhaduri & Marglin, 1990). Therefore, to guarantee sustainable economic growth in the case of wage-led aggregate demand, is absolutely fundamental that there is a positive response of investment to changes in income distribution, in order to guarantee the expansion of potential output and avoid inflationary pressures. That means that the accelerator effect must outweigh the reduction of investment due to loss of profitability to maintain the stability of the wage-led regime (Blecker, 2015).

Wage share estimation

The functional distribution of income has the disadvantage that it combines all of the wages and salaries in an economy. The wage share considers all of the agents that receive wages and salaries, from unskilled workers to managers, executives, and CEO's. However, in recent years, the process of globalization and the increase in size and complexity of financial markets contributed to consolidate the "managerial" worker (Stockhammer, 2004) and increase their income. In some countries, the wage and salaries participation on the GDP can exhibit a relatively stable trend while the personal income distribution worsens simultaneously (Stockhammer, 2013). The presence of these characteristics in an economy shows the consolidation and expansion of the "managerial" worker, which are classified as salaried, and are in the top of the personal income distribution. Thus, by examining the difference between the "average" worker and the managerial worker, we can understand a more precise picture of the condition of the working class.

Once we have considered this, we can estimate an adjusted wage mass that excludes the income of the managerial class, through:

$$W \cdot L = Average\ nominal\ wage \cdot Total\ employment$$

$$W_M \cdot L_M = Average\ nominal\ wage\ of\ managers \cdot Employment\ of\ managers$$

Subtracting the previous expressions, we obtain the adjusted nominal wage mass:

$$A(W \cdot L) = W \cdot L - W_M \cdot L_M$$

Dividing the average adjusted nominal wage mass by the nominal GDP at factor cost, we obtain the adjusted wage share. Furthermore, we can estimate the fraction of GDP at factor cost that the managerial class earns and the fraction of the total (unadjusted) wage mass that they represent.

For the estimation of the Chilean adjusted wage mass, we use monthly data provided by the Central Bank of Chile and the National Institute of Statistics of Chile (INE) to analyze the 1996-2017 period. To convert data from monthly to quarterly, we sum the average nominal wage of both types of workers by quarter to obtain the quarter "total wage cost". We obtain the quarter employment data by averaging the monthly employment by type of worker quarter by quarter.

In 2010, the INE changed the category of managerial employment from "Managers, administrators and directors" to "Members of the executive branch, legislative bodies and senior management," to solve the change of measurement problem we use the month-on-month growth from the latter specification and apply it to the monthly employment of the first specification to obtain the missing data. We apply a simple test of difference of means and variances to the quarter-on-quarter growth and month-on-month growth, to check if there is a break in the series due to the change in managerial employment specification. In the four tests, we cannot reject, with a level of 99% of confidence, the null hypothesis of equality in means and variances[3].

Table 3: Average nominal wage and employment by type of worker (1996-2017)

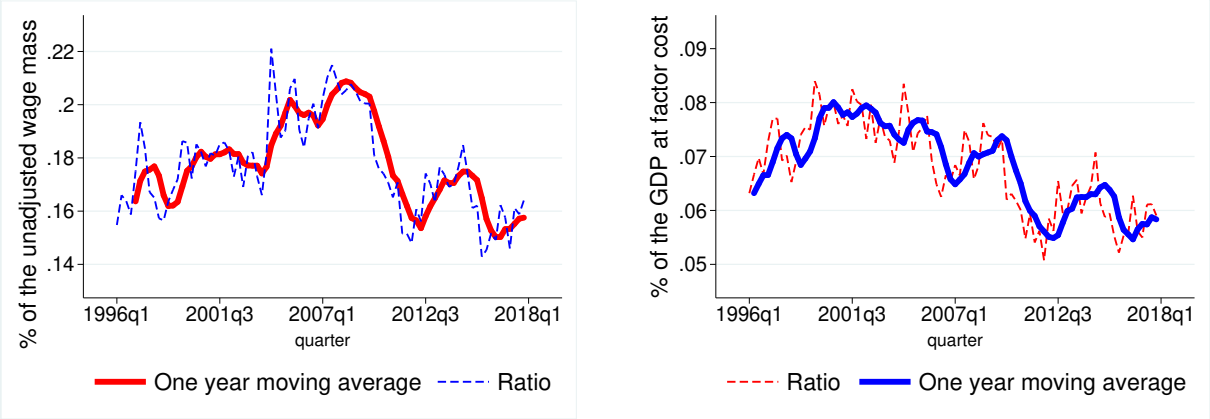
	Nominal wage (thousands CLP)			Employment (thousands of persons)		
Period	General	Managerial	Ratio	General	Managerial	Ratio
1996-2002	231,55	1117,07	4.82	5380,80	194,17	0,04
2003-2007	306,91	1516,93	4.93	6139,30	242,88	0,04
2008-2010	393,74	2076,30	5.28	6826,77	246,24	0,04
2011-2014	480,47	2454,39	5.11	7711,06	252,27	0,03
2015-2017	587,85	3000,84	5.10	8152,09	247,98	0,03

Source: Own elaboration with data from INE and the Central Bank of Chile.

Table 3 shows the Chilean monthly nominal average wage and employment, differentiating the "average" worker from managerial. We observe that the wage of the managerial worker is on average 5 times higher than the wage of a normal worker. Approximately 3% of all workers belong to the managerial class. Until the financial crisis of 2007, we observe that the managerial wages increased faster than the average wages, due to the increase in the ratio of wages. In relation to employment until 2007, we can observe a similar trend of a relatively faster increases in the rate

[3]To check the tests results, see the statistical appendix 1.

Figure 1: Managerial wage mass as percentage of the unadjusted wage mass and of GDP



Source: Own elaboration with data from INE and the Central Bank of Chile.

of employment of managers in relation to the average worker, where it slows.

Graph 1 illustrates two ratios, panel one exhibits the ratio between the managerial wage mass (WM · LM) and the total (unadjusted) wage mass (W · L). We can observe a positive trend until 2009. Additionally, the third quarter of 2003 the average participation of managerial wage was relatively stable. With the rise of commodity prices, the wage ratio rose to its peak in 2004 with a 22% of the total unadjusted wage mass. The average share of managerial wage mass in the unadjusted wage mass is 17.8%. If we consider that the managerial worker only represents the 3% of employment, we can partially understand the grade of concentration of income in Chile.

Panel two depicts the difference between both wage shares, or in other words, the percentage of GDP at factor cost that is appropriate by the managerial class. The average difference between the wage share and the adjusted wage share is 6.8% of the GDP at factor cost between 1996 and 2017 and fluctuated between 5.1% and 8.4% in that period. If we ignore the income of the managerial class we would overestimate the wage share, and as we can see, the difference between both wage masses is relevant both in the unadjusted wage mass and GDP. Finally, we are going to add the income of the managerial class into the profit mass, to capture in the most accurate way the process of capital property scattering (Schumpeter, 1983) and its impact on the income distribution of Chile.

Once we have considered these factors, we can compute a more accurate wage and adjusted wage mass. Through this we can estimate a profit mass and profit share for Chile following the Kaleckian approach (Kalecki, 1954):

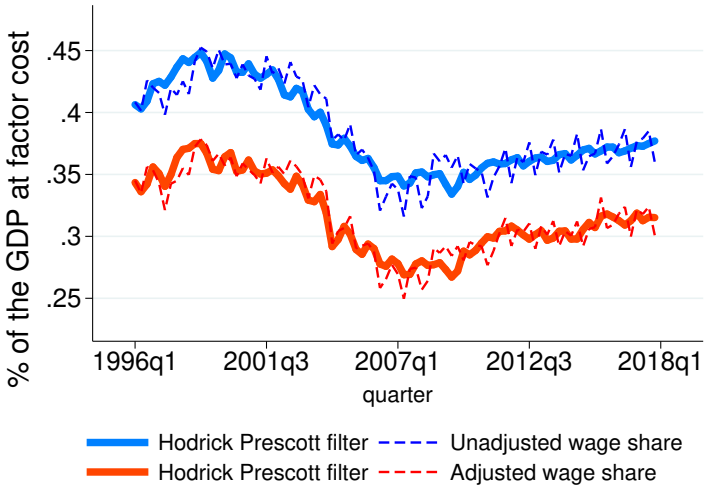
$$GDP = Profits + Adjusted\ wage\ mass$$

$$\frac{Profits}{GDP} = 1 - \frac{Adjusted\ wage\ mass}{GDP}$$

Graph 2 illustrates the unadjusted wage share (that includes the managerial wage mass) and the adjusted wage share (without the managerial wage mass), both with a Hodrick-Prescott filter

to observe the trend through the period 1996-2017. The average wage share is near 39%, while the average adjusted wage share was 32% in this period. This value is coherent with the international and regional comparisons. It is a stylized fact that the developed/industrialized countries have higher wage shares in relation to developing countries (Guerriero, 2012). Also, in relation to other Latin-American countries the mean of the period is slightly above the average value for the region which is 35% of the GDP in the period 1996-2014 and for Chile was 38.3% for the same period (Alarco, 2014).

Figure 2: Adjusted and unadjusted wage mass as percentage of the GDP at factor cost



Source: Own elaboration with data from INE and the central bank of Chile.

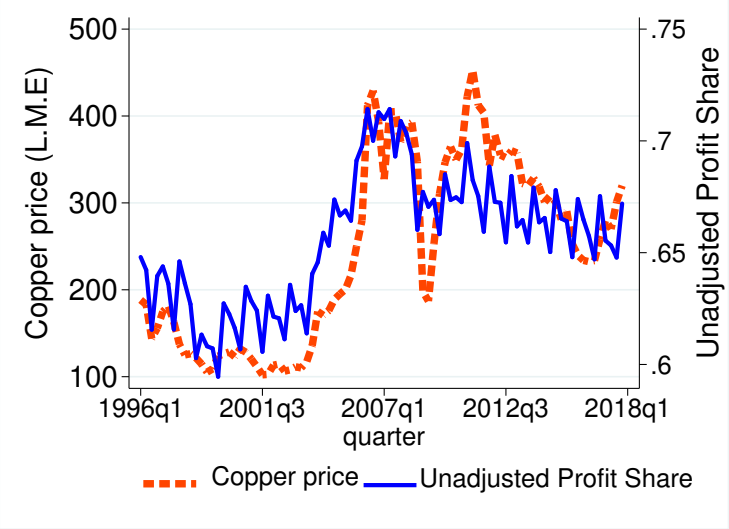
In graph 2, we observe a stable participation of both wage shares before 2003, when there was an abrupt decrease in the participation of GDP. The mean of the adjusted wage share before the boom of commodities was 35% of GDP and the mean of the unadjusted wage share was 43% in the same period (1996-2003). The sharp decrease in the wage share was near 8% in both series, with a greater decline in the unadjusted wage share than in the adjusted wage share. The counterpart of this decrease in the wage share is the rise of the profit share that happened in the first commodity boom.

Several authors have also identified an increase in the profit share through functional income distribution estimations. Alarco (2016) estimates that the Chilean wage share decreased by 6.5% in that period. The ILO estimates that the profit share in Chile rises by almost 10% in the period between 2003-2006 (Gammage, Alburquerque & Duran, 2014) and the ECLAC estimates that the wage share fell more than 6% in that period (Abeles, Amarante & Vega, 2014).

The strong wage share decrease can be understood from the relationship between the prices of raw materials and the wage bill. This argument was elaborated by Michal Kalecki in his theory of the economic cycle, explaining that "a rise in raw materials prices in relation to unit wage costs causes a fall of the relative share of wages in the value added" (Kalecki, 1954). In graph 3, we can see the relationship between the copper price and the profit share; if the price of raw materials increases more than the wages, then the wage share will fall due to the existence of

other production processes and social statements that can obtain profits from this increase on prices.

Figure 3: Copper price and Unadjusted profit share



Source: Own elaboration with data from COCHILCO, INE and the Central Bank of Chile.

The empirical data shows a strong positive correlation between the Chilean profit share and the commodities prices, especially in the price of copper. Table 4 displays the correlation between the profit share and the commodity prices, testing correlations at a 99% level of significance, where we see all of the correlations are significant and positive. Following the Kaleckian theory of prices, the price of raw materials is determined by demand. This initial demand increase is accompanied by a secondary "speculative demand" that will lead to even higher prices in raw materials (Kalecki, 1954, p.29). In this way, the behavior of the international financial system has a crucial role in the determination of inequality in developing countries (Perez, 2017), since the profits are composed by a considerable heterogeneity of income and strong bonds with the financial system and commodities rents.

Table 4: Correlations between the profit share and commodity prices (1996-2017)

	All Commodities	Non-fuel Commodities	Food and Beverage	Food	Beverage	Agricultural Raw Materials	Copper
Profit Share	0.734*	0.708*	0.619*	0.624*	0.524*	0.448*	0.811*

The * represents significance at the 99% level.

Source: Own elaboration with data from IMF and the Central Bank of Chile.

Empirical strategy

With the purpose of estimating the effect of an income redistribution on aggregate demand i.e. determining if Chile is in a wage-led or profit-led regime; we must analyze the impact of an increase in the profit share on each of the components of aggregate demand (consumption, investment, exports and imports). We follow the methodology used in the works of Galanis and Onaran (2012), where a single equation model for each component is estimated. This approach is known as the structural-approach to estimate the effect of income distribution on demand (Blecker, 2015). This method has the strength that allows us to distinguish the domestic effect and the total effect (which includes international trade). However this approach has two main drawbacks: (1) Estimations are very sensitive to the functional forms, lag lengths and control variables (Blecker, 2015). (2) We assume that the distribution of income is exogenous (Rodriguez, 2013), which could lead to simultaneity bias. The choice of this methodology is based on the capacity of interpretation of the results at the expenses of some bias.

First, we need to check if our variables are not stationary and cointegrated. If all of the variables in each model are cointegrated, we estimate an Error Correction Model (ECM) to observe the long-term relationship of each component of aggregate demand. If the variables are not stationary and not cointegrated, we proceed to estimate specifications in differences.

Consumption functions

As the literature in wage-led growth highlights, the impact on consumption will stimulate aggregate demand if the real wage increases (Stockhammer, 2011), due to the assumption that the marginal propensity to consume out of wages is higher than the out of profits. Therefore, we will estimate four functions to determine the impact of a redistribution of income on: (1) aggregate consumption, (2) consumption of durable goods, (3) consumption of non-durable goods and (4) consumption of services.

First, we will estimate the relationship between the income of both social classes and all the different specification of consumption, expressed as follows:

$$C = f(P, W)$$

Here C is the aggregate real consumption of both social classes (or the consumption of durable, non-durable goods and services depending on the case), W is the real wage bill and P is the real profit bill. All the variables are in logarithm. The unit root test indicates that all of these variables are integrated of order 1 and that exists cointegration between them.

Thus, the error correction model (ECM) to estimate will depend on the number of lags (n):

$$\Delta C_t = \beta_0 + \beta_1 C_{t-1} + \beta_2 W_{t-1} + \beta_3 P_{t-1} + \sum_{i=1}^{n} \alpha_{i-1} \Delta C_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta W_{t+1-i} + \sum_{i=1}^{n} \delta_i \Delta P_{t+1-i} + u_t$$

Where α_0=0, due to the formal representation of an ECM. The β coefficients represent the long run relationships among the variables, i.e. the effect on consumption given a permanent

change in the wage and profit bill. The α, γ and δ coefficients represent the short run elasticities between consumption, its lags, wage bill and profit bill. u_t is the error term.

As we are interested in the long-term interaction of the income of both social classes and consumption, we can represent the error correction (EC) part of the ECM (or the long run relationship) as:

$$EC = \beta_1(C_{t-1} - \frac{-\beta_2}{\beta_1}W_{t-1} - \frac{-\beta_3}{\beta_1}P_{t-1})$$

Consequently, the marginal propensities to consume, or the long run elasticities, out of wages and out of profits are $-\beta_2/\beta_1$ and $-\beta_3/\beta_1$ respectively.

As we look for the optimal number of lags, we run several ECM with different lags, following the AIC/BIC criteria to choose the optimal model (the bold headliner of the model). We exhibit only the long run elasticities (the error correction) of the models because we are only interested in the long-term relationships among the variables. Additionally, we incorporate the Durbin-Watson statistic to check the autocorrelation of the residuals, and the CUSUM statistic in order to check the stability of the parameters. The differences among the specifications are that the number of the specification indicates the number of lags included in the ECM.

Table 5: Long-term relationship between aggregate consumption and classes incomes

Lags	(1)	(2)	(3)	(4)	(**5**)	(6)	(7)	(8)
C_{t-1}	-0.79***	-0.97***	-0.64***	-0.24	-0.44***	-0.39**	-0.36*	-0.49**
W_{t-1}	0.57***	0.66***	0.45***	0.15	0.31***	0.28**	0.25*	0.32**
P_{t-1}	0.24***	0.33***	0.21***	0.09	0.14**	0.13**	0.12*	0.18**
Marginal propensities to consume								
Out of Wages	0.72	0.68	0.70	-	0.70	0.71	0.71	0.65
Out of Profits	0.31	0.34	0.32	-	0.33	0.32	0.33	0.36
N	87	86	85	84	83	82	81	80
adj. R^2	0.798	0.831	0.847	0.891	0.932	0.934	0.931	0.935
AIC	-352.90	-360.99	-361.34	-382.85	-417.54	-412.20	-400.94	-399.10
BIC	-338.11	-338.90	-332.03	-346.39	-374.00	-361.66	-343.47	-334.79
DW	-1.82	1.75	2.12	1.41	1.89	2.02	2.03	1.93
$CUSUM$	-0.33	0.77	0.67	0.55	0.66	0.58	0.78	0.54

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In table 5, all β_1 parameters are negative and statistically significant (less in the fourth specification), which confirms the existence of cointegration among the variables. Additionally, all specifications (except the fourth) do not exhibit autocorrelation between the error term and the parameters in all specifications are stable. Then, the optimal ECM is the specification 5 (five lags) based on the lowest value of the AIC and BIC criteria. We can confirm our hypothesis, that the propensity to consume out of wages is considerable higher than the propensity to consume out of profits (Galanis & Onaran, 2012), not only in the selected specification but in all of them.

Once we have determined the elasticities, we will be able to transform it into marginal effects

with the purpose of estimating the effect of an increase in the profit share (i.e. a decrease in the wage share) on total consumption, through multiplying the propensities to consume by the mean values of consumption, wages and profits, through the expression:

$$\frac{\partial C}{\partial P} = \frac{\partial C/Y}{\partial P/Y} = \frac{-\beta_3}{\beta_1} \cdot \frac{C}{P} - \frac{-\beta_2}{\beta_1} \cdot \frac{C}{W}$$

Then, the marginal effect not only will depend on the marginal propensities to consume but it will also depend on the level of inequality measured as the ratio of aggregate consumption on profits and wages. Then, we apply the same methodology (ECM) to the consumption of durable, non-durable goods, and services, with the objective of observing the effects of redistribution on the (non) tradable sector of the Chilean economy. As we can see in the statistical Appendix 2 and in table 6, the difference between the propensities to consume durable goods becomes relatively smaller in relation to aggregate consumption. If we consider that a substantial fraction of the durable goods that are consumed in Chile are foreign, then a redistribution of income that enhances consumption of this type of goods will cause an increase in imports and consequently will reduce the aggregate demand. Contrastingly, the long-term relationship of the consumption of non-durable goods and profits disappears in five of the eight specifications, while the marginal propensity to consume out of wages rises to 0.8.

Finally, the long-term relationship of the consumption of services, which is mostly produced by the non-tradable sector of the economy, exhibits a stronger dynamic given that the marginal propensity to consume out of profits rises to 0.42 while the marginal propensity to consume out of wages is 0.65. Despite this, a redistribution of income, favorable to the wage earners, will result in an increase in the demand of services, which given that they are mostly non-tradable, should stimulate domestic demand and production.

Once we determine all marginal propensities in all consumption specification, we transform it into marginal effects, to obtain the net effect of an increase of 1% in the profit share. Table 6 presents the effect on aggregate consumption and its specifications due to a 1%-point increase in the profit share; specifying the long run elasticities, the marginal effects by social classes, and its net impact on demand.

Table 6: Long run elasticities and marginal effects of consumption and classes incomes

	Elasticities		Marginal effect		Net effect of an increase in 1% of Profit share (A)-(B)
	Out of Wages	Out of Profits	Out of Wages (A)	Out of Profits (B)	
Aggregate Consumption	0.7	0.33	1.524	0.333	**-1.191**
Consumption of durable goods	0.84	0.61	0.151	0.050	-0.101
Consumption of non-durable goods	0.8	0	0.758	0	-0.758
Consumption of services	0.65	0.42	0.689	0.202	-0.488

We can perceive that an increase in profit share leads to a decrease in consumption of durable goods, non-durable goods, services and aggregate consumption. The net effect of 1%-point increase in the profit share on aggregate consumption is a reduction of -1.2%; this result is considerable higher (in absolute value) than in other estimations for developing countries. Since the marginal effect contains the marginal propensities to consume, which are considerable different from each other, and the ratio of the mean values of consumption and wage bill. If an economy has a considerable participation of consumption on GDP (in Chile the average participation of consumption in GDP is 61%) and a relatively low wage share participation (or an adjusted wage bill without the income of the managerial class which in average represents the 32% of the GDP), then the ratio of these variables will enhance the marginal effect of an increase in the wage bill, explaining the high effect of a redistribution of income on consumption.

Investment function

The investment effect on redistribution will determine if the domestic demand of a country is in a profit-led or wage-led regime, as a consequence of the degree of responsiveness to profitability. If a country has a high sensitivity to profits, then an increase in the profit share should positively affect investment and this effect could overshadow the negative effects of an increase in the profit share on consumption, leading to a decrease in the domestic demand of an economy. Contrastingly, if the investment is relatively insensitive to profits and is highly sensitive to the demand level, then the accelerator effect dominates the profitability effect, and consequently, the domestic demand should rise, and this economy should be in a wage-led domestic demand regime.

To estimate the effect of an income redistribution on investment, we use the following function:

$$I = f(P_s, Y, r, p_c)$$

Where I is the real investment, P_s is the adjusted profit share, Y is the real GDP, r is the monetary policy rate and p_c is the copper price. All the variables are in logarithm. Also, all variables are non-stationary but as we cannot confirm the presence of cointegration among these three variables (but does exist cointegration between investment and aggregate demand) we cannot estimate the long run relationship between the profit share and investment through an ECM, so we proceed to estimate the next model in differences.

$$\Delta I_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i \Delta Y_{t+1-i} + \sum_{i=1}^{n} \beta_i \Delta Ps_{t+1-i} + \sum_{i=1}^{n} \gamma_i \Delta r_{t+1-i} + \sum_{i=1}^{n} \delta_i \Delta pc_{t+1-i} + \sum_{i=1}^{n} \omega_i \Delta I_{t-i} + u_t$$

If there is no cointegration among the variables, we can only observe the short run effect among them, so we run models with different lags in order to obtain the most accurate specification. Once we have determined it, we can obtain the short-run relationship among the profit share and investment adding up the β_i parameters (if they are statistically significant) and dividing it by one less the sum of the ω_i parameters (if they are statistically significant).

Our results are in table 7. We omit the parameter α_0 because it is statistically insignificant in all specifications. We found a positive relationship between the profit share and the level of investment. Additionally, we found a positive relationship between the level of income/output

and investment. No specification presents problems of autocorrelation or instability on the parameters.

Table 7: Different specifications for the investment function.

	(1)	(2)	(3)	(4)	(5)	**(6)**	(7)
ΔPs_t	-0.91*	-0.73**	-0.78**	-0.67*	-0.53	-0.43	-0.66*
ΔPs_{t-1}		0.95**	1.01**	0.99**	0.88**	0.80**	0.71*
ΔY_t	3.02***	2.00***	2.10***	1.99***	2.93***	2.78***	2.85***
ΔY_{t-1}	-1.78***	-1.72***	-1.78***	-1.48***	-1.53***	-1.55***	
Δr_t	0.02	0.07**		0.07***		0.06**	0.07***
Δr_{t-1}		0.00	0.04*				
Δpc_t	-0.07	-0.13**	-0.16***	-0.13**	-0.17***	-0.14***	
Δpc_{t-1}		0.14***	0.17***	0.14***	0.14***	0.13***	
ΔI_{t-3}					0.26***	0.25***	0.25***
Profit share elasticity of investment							
e_{ps}	-0.91	0.22	0.23	0.32	1.19	1.07	0.07
N	83	82	82	83	84	83	83
adj. R^2	0.726	0.890	0.884	0.891	0.895	0.903	0.888
AIC	-174.14	-242.50	-238.64	-248.01	-252.63	-256.66	-246.49
BIC	-162.04	-220.84	-219.39	-228.66	-233.18	-234.89	-229.56
DW	-2.07	1.99	1.97	1.98	2.15	2.20	2.16
$CUSUM$	0.86	0.42	0.73	0.36	0.45	0.40	0.34

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

As we can see the sixth model has the best value following the AIC/BIC criteria, so the relationship between the profit share and investment is given by:

$$e_{Ps} = \frac{\sum_{i=1}^{n} \beta_i}{1 - \sum_{i=1}^{n} \omega_i} = 1.07$$

Therefore, we transform this elasticity into marginal effect in the same way that we did for the consumption function.

$$\frac{\partial I/Y}{\partial P/Y} = i_{Ps} \cdot \frac{I}{P} = 0.402$$

As we can see the marginal effect of a 1%-point increase in the profit share boosts I/Y by 0.4%. The relatively slow impact of the marginal effect could be attributed to the fact that the mean value of investment is considerable smaller if we compare it with the mean value of the profit mass; as a matter of fact, the mean value of the investment participation in the GDP is 23% and the mean value of the profit share is 68%. This could explain that the marginal effect is considerable lower than in other countries (Onaran & Galanis, 2012) where the investment has a bigger participation in the determination of aggregate demand.

If we add this finding to the consumption effect, we obtain that a 1%-point increase in the profit share decreases domestic demand by 0.8 percentage points. Hence, we can infer that the Chilean domestic demand is in a wage-led regime, due to the high difference between propensities to consume and a relatively low participation of investment in aggregate demand. This finding

is also common in the empirical literature (Onaran & Galanis, 2012) because virtually every country's domestic demand is in a wage-led regime, though it is the effect of net exports that determines the overall economic regime.

Intern price function

To estimate the effects of redistribution on net exports we consider three functions, one for domestic prices, imports and exports with the purpose to compute, through the chain rule, the effect of higher real wages over intern prices and how this could harm international competitiveness and aggregate demand.

An increase in the real wages eventually could increase the price level of an economy and, in turn, this could provoke a rise in the difference between the intern prices and import prices of goods, leading to a substitution between national goods and import goods anchoring the growth of aggregate demand. For the estimation of an increase of nominal wages over domestic prices, we determine it as a function of nominal unit labor costs (ULC), import prices (Pm) and copper price (pc) as a control variable.

$$p = f(P_m, ULC, p_c)$$

We define the real unit labor cost (RULC) as the ratio of wage mass and GDP (i.e. the wage share as ratio of GDP at factor cost multiplied by the ratio of GDP at factor cost and GDP), therefore unit labor cost is the real unit labor cost times the domestic prices.

$$RULC = \frac{W}{Y_{fc}} \cdot \frac{Y_{fc}}{Y}$$

As we cannot confirm the existence of cointegration among the variables, we estimate the following model in difference:

$$\Delta p_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i \Delta(P_m)_{t+1-i} + \sum_{i=1}^{n} \beta_i \Delta ULC_{t+1-i} + \sum_{i=1}^{n} \gamma_i \Delta(pc)_{t+1-i} + \sum_{i=1}^{n} \delta_i \Delta p_{t-i} + u_t$$

Where p is the GDP deflator, P_m is the import price deflator, ULC is the nominal unit labor cost and pc is the nominal price of refined copper. All the variables are in logarithm.

Table 8: Different specifications for the intern price function.

	(1)	(2)	(3)	(4)	**(5)**	(6)	(7)	(8)
ΔULC_t	0.04	-0.20***	-0.14**	-0.15**	-0.13**	-0.14**	-0.14**	-0.14**
ΔULC_{t-1}		-0.13						
ΔULC_{t-2}		0.21***	0.26***	0.27***	0.24***	0.25***	0.25***	0.25***
ΔPm_t	-0.12***	-0.11***	-0.11***	-0.11***	-0.13***	-0.11***	-0.11***	-0.11***
ΔPm_{t-3}					-0.11***	-0.12***	-0.12***	-0.11***
Δpc_t	0.01	0.01		0.01		0.03	0.03	0.03
Δpc_{t-1}						-0.02	-0.02	-0.01
Δpc_{t-2}							0.00	-0.01
Δpc_{t-3}								0.03**
Unit labor cost elasticity of intern prices								
e_{ULC}	0	0.01	0.12	0.12	0.11	0.11	0.11	0.11
N	87	85	85	85	84	84	84	84
adj. R^2	0.111	0.253	0.242	0.238	0.341	0.346	0.337	0.363
AIC	-432.84	-436.18	-436.79	-435.45	-442.29	-441.06	-439.09	-441.58
BIC	-422.98	-421.53	-427.02	-423.21	-430.13	-424.05	-419.65	-419.70
DW	2.00	1.79	1.72	1.79	1.73	1.88	1.89	1.82
$CUSUM$	0.42	0.47	0.72	0.5	0.88	0.64	0.79	0.42

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

We found a positive relationship among the nominal unit labor cost and the domestic prices in five of eight specifications. We selected model six, given that it has the lowest value of the criteria AIC/BIC. Then, the short run elasticity among the unit labor cost and domestic prices is 0.11%. Once we have computed this parameter, we can estimate the effect of real unit labor cost (RULC) on nominal unit labor cost (ULC), through:

$$ULC = RULC \cdot P$$

$$\frac{\partial ln(RULC)}{\partial ln(ULC)} = \frac{\partial ln(ULC)}{\partial ln(ULC)} - \frac{\partial ln(P)}{\partial ln(ULC)} = 1 - e_{ULC}$$

$$\frac{\partial ln(ULC)}{\partial ln(RULC)} = \frac{1}{1 - e_{ULC}} = 1.12$$

Where e_{ULC} is the effect of unit labor cost on domestic prices. So, a 1%-point increase of the real unit labor cost leads to a 1.12% nominal unit labor cost increase. And a 1%-point increase of the nominal unit labor cost will increase domestic prices by 0.11%-point.

Import function

With the purpose to estimate the impact of a growth on domestic prices in the demand for imports, we estimate the imports as a function of the ratio between domestic and import prices, and the exchange rate [4]:

$$M = f(\frac{p}{P_m}, \epsilon)$$

[4]We did not include the GDP as a variable into the import function because it makes unstable some specification of the ECM.

As we can confirm the existence of cointegration between the imports, the ratio between domestic and import prices and the real exchange rate, we are able to estimate the following ECM:

$$\Delta M_t = \beta_0 + \beta_1 M_{t-1} + \beta_2 \frac{p}{P_m}_{t-1} + \beta_3 \epsilon_{t-1} + \sum_{i=1}^{n} \alpha_{i-1} \Delta M_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta \frac{p}{P_m}_{t+1-i} + \sum_{i=1}^{n} \delta_i \Delta \epsilon_{t+1-i} + u_t$$

Where M is the real imports, $\frac{p}{P_m}$ is the ratio between domestic and import prices and ϵ is the real exchange rate. All the variables are in logarithm. The long term elasticities are shown in table 9.

Table 9: Long-term relationship between imports and the ratio of intern and import prices

Lags	(1)	(2)	**(3)**	(4)	(5)	(6)	(7)	(8)
M_{t-1}	-0.16***	-0.22***	-0.21***	-0.21***	-0.25***	-0.19***	-0.19**	-0.17*
ϵ_{t-1}	0.22**	0.34***	0.37***	0.41***	0.45***	0.34**	0.33**	0.33*
$\frac{p}{P_m}_{t-1}$	0.22***	0.29***	0.26***	0.24***	0.30***	0.22**	0.23*	0.21
price ratio elasticity of imports								
$e_{\frac{p}{P_m}}$	1.38	1.31	1.24	1.14	1.2	1.16	1.21	0
N	87	86	85	84	83	82	81	80
adj. R^2	0.629	0.688	0.739	0.745	0.756	0.761	0.749	0.748
AIC	-255.97	-263.99	-273.26	-268.81	-268.39	-264.10	-254.69	-249.31
BIC	-241.18	-241.90	-243.95	-232.35	-224.85	-213.56	-197.22	-185.00
DW	1.71	1.97	2.10	1.98	1.85	2.04	1.96	1.97
CUSUM	-0.55	0.62	0.74	0.48	0.57	0.74	0.98	0.74

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The optimal number of lags in the ECM for the imports equation is 3, as it has the best value of the AIC/BIC criteria. No specification has problems of autocorrelation and only the parameters of the seventh specification are unstable. We found a positive relationship between the ratio of prices and imports, which confirms our hypothesis that an increase of domestic price will diminish the demand of national goods and an increase in the demand for imports. As we can see in table 9, a 1%-point increase of the ratio of domestic/import prices generates an increase in imports of 1.24%. Since we estimated the elasticity among the unit labor cost and domestic prices and the elasticity among the domestic prices and imports; we can estimate, through the chain rule, the effect of an increase in the real wage on imports, with the following expression (the average values of (M/Y)/RULC are used to obtain the marginal effect):

$$\frac{\partial M/Y}{\partial W/Y} = \left[\frac{\partial M}{\partial P} \cdot \frac{\partial P}{\partial ULC} \cdot \frac{\partial ULC}{\partial RULC} \cdot \frac{\partial RULC}{\partial W/Y_{fc}} \right] \cdot \frac{M/Y}{RULC}$$

As we defined the real unit labor cost as the adjusted wage share times the ratio between GDP at factor cost and GDP, the change on RULC due to a change in the adjusted wage share is simply the ratio between GDP at factor cost and GDP. Then, we can rewrite the previous expression as:

$$\frac{\partial M/Y}{\partial W/Y} = \left[e_{M/p} \cdot e_{p/ULC} \cdot \frac{1}{1 - e_{p/ULC}} \cdot \frac{Y_{fc}}{Y} \right] \cdot \frac{M/Y}{RULC}$$

The table 10 exhibits the calculation of the marginal effect of a 1%-point increase in the wage share. Through the chain rule, we identify that a 1%-point increase in the wage share leads to a 0.15% increase in imports, since this increase in real wages leads to an increase in the domestic prices and this generates substitution of national goods by imports goods, increasing its demand. Since the effect of an increase on the wage share is the inverse of an increase on the profit share, the effect of a 1%-point increase in the profit share leads to a decrease of 0.15% of imports and consequently, an increase in aggregate demand.

Table 10: Calculation of the marginal effect of a 1%-point increase in the profit share on imports

$e_{M/p}$	$e_{p/ULC}$	$e_{ULC/RULC}$	$e_{M/RULC}$	Y_{fc}/Y	M/Y	RULC	$\frac{\partial M/Y}{\partial W/Y}$	$\frac{\partial M/Y}{\partial P/Y}$
A	B	C	D=(A*B*C)	E	F	G	D*E*F/G	-D*E*F/G
1.24	0.11	1.12	0.15	0.913	0.31	0.29	0.148	-0.148

Export function

With the purpose of estimating the effect of a profit share increase in the Chilean exports, we are going to calculate it as a function of real unit labor cost, the real exchange rate, and the real GDP of the key commercial partners of Chile (United States, Japan, China and the Euro Area). We use the real unit labor cost as dependent variable because we were not able to find a negative relationship between the exports and the ratio of exports and imports price (i.e. the terms of trade) in the 1996-2017 period. As a matter of fact, the relationship is strongly positive, consequently we could infer that an increase in the unit labor cost will enhance the export prices and this could enhance exports, which it is not coherent with our theoretical framework.

$$X = f(RULC, \epsilon, Y')$$

As we cannot confirm the existence of cointegration among the variables, we estimate the following model in differences:

$$\Delta X_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i \Delta Y'_{t+1-i} + \sum_{i=1}^{n} \beta_i \Delta RULC_{t+1-i} + \sum_{i=1}^{n} \gamma_i \Delta \epsilon_{t+1-i} + \sum_{i=1}^{n} \delta_i \Delta X_{t-i} + u_t$$

Where Y' is the real GDP of the main commercial partners of Chile (measured in consent 2010 USD), RULC is the real unit labor cost and ϵ is the real exchange rate. All the variables are in logarithm.

In the table 11, we can confirm the hypothesis that higher real unit labor cost (measured as the ratio between the wage mass and GDP) has a negative impact on exports. Despite this export price has a relative low adjusted R2, the chosen specification is the third because it has the best value of AIC/BIC criteria. Therefore, a 1%-point increase in real unit labor cost will produce a 0.19%-point drop of exports.

Table 11: Difference specifications for the export function.

	(1)	(2)	**(3)**	(4)	(5)	(6)	(7)	(8)
$\Delta RULC_t$	-0.36***	-0.36***	-0.32***	-0.31***	-0.32**	-0.33***	-0.28**	-0.35***
$\Delta\epsilon_t$	-0.37**	-0.40**	-0.39**	-0.37**		-0.44**		-0.37**
$\Delta\epsilon_{t-1}$	0.26	0.28*	0.28*			0.34*	0.25	
$\Delta\epsilon_{t-2}$	0.12				0.24			
$\Delta Y'_t$	-0.15	-0.16			-0.12			-0.19
$\Delta Y'_{t-1}$	0.80***	0.79***	0.86***	0.91***	0.88***		0.91***	0.82***
$\Delta Y'_{t-2}$	0.56**	0.57**	0.60**	0.67**	0.67**	0.26	0.67**	0.63**
ΔX_{t-1}	-0.50***	-0.49***	-0.47***	-0.49***	-0.50***	-0.41***	-0.45***	-0.51***
ΔX_{t-3}	-0.22**	-0.23**	-0.24**	-0.21**	-0.21**	-0.19*	-0.26**	-0.20*
Real unit labor cost elasticity of exports								
e_{RULC}	-0.21	-0.21	-0.19	-0.18	-0.19	-0.21	-0.16	-0.22
N	84	84	84	84	84	84	84	84
adj. R^2	0.371	0.375	0.380	0.365	0.334	0.293	0.342	0.360
AIC	-251.70	-253.10	-254.77	-253.59	-248.66	-244.56	-250.61	-252.01
BIC	-227.39	-231.23	-235.33	-236.57	-229.21	-227.55	-233.60	-232.56
DW	2.03	2.08	2.08	2.00	2.01	2.19	2.03	2.01
$CUSUM$	0.87	0.86	1.00	1.07	0.77	0.81	0.95	0.82

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Once we have estimated this elasticity, we are able to compute the effect of an increase in the profit share on exports and the net exports, through:

$$\frac{\partial X/Y}{\partial W/Y} = \left[\frac{\partial X}{\partial RULC} \cdot \frac{\partial RULC}{\partial W/Y}\right] \cdot \frac{X/Y}{RULC} = \left[e_{RULC} \cdot \frac{Y_{fc}}{Y}\right] \cdot \frac{X/Y}{RULC}$$

Table 12: Calculation of the marginal effect of a 1%-point increase in the profit share on exports

e_{RULC}	$\frac{Y_{fc}}{Y}$	$\frac{X}{Y}$	RULC	$\frac{\partial X/Y}{\partial W/Y}$	$\frac{\partial X/Y}{\partial P/Y}$	$\frac{\partial M/Y}{\partial P/Y}$	$\frac{\partial X_n/Y}{\partial P/Y}$
A	B	C	D	E (A*B*C/D)	F (-E)	G	F-G
-0.19	0.91	0.34	0.29	-0.204	0.204	-0.148	0.352

As we can see in the table 12, there is a negative relationship among the wage share and the net exports mostly because of the effect of real wages on exports. Therefore, a 1%-point increase in profit will increase exports by 0.2%-points, and decrease imports by 0.15%-points. If we sum this effect, then an increase in the profit share will increase net exports by 0.35%-points. This value is coherent with the results of Onaran & Galanis (2012) for other developing countries as Mexico and South Korea.

So far, we have seen that the increase in the wage share reduces net exports which can lead to economic disequilibrium in the current account. However, it is paramount to highlight that the increase in wages could lead to induced labor-saving technological progress (Funk, 2000; Marquetti, 2003) which can mitigate the loss of international competitiveness and therefore, reduce the negative impact of higher wages on the evolution of the current account.

Total effects and national multiplier

Once we have estimated the effect of a 1%-point increase in the profit share, on consumption, investment and net exports, we are able to compute the total effect on aggregate demand. Table 13 summarizes the effect of a 1%-point increase in the profit share on each component of the aggregate demand, which is based on the outcome of the tables 5, 7 and 12. The domestic and total effect is reported in columns three and five, respectively. Following the methodology of Galanis and Onaran (2012) we call the sum of the partial effects, the effect on private excess demand. We estimate the marginal effect by evaluating the mean of the total sample and the mean of the year 2017, in order to capture the differences in the marginal effects.

If we observe the third column, we can see the effects of a 1%-point increase in the profit share on domestic private demand, where the effect on private consumption is considerably larger than the effect on private investment (in absolute value). Then we can conclude that the Chilean domestic demand is strongly wage-led, because a 1%-point increase in the profit share triggers a 0.79% decrease in domestic private excess demand for the mean values, and a decline of 0.81% in 2017; but when we take into account the effect on net exports, this effect is partially reduced, thus a 1%-point increase in the profit share leads to a 0.44%-point decrease in the total aggregate demand in the mean values, and in the year 2017 this decrease is about 0.5%-point. Therefore, we can conclude that Chile in the last twenty years had been in a wage-led regime because an increase in the profit share leads to a decrease of the aggregate demand (in average for that period).

Table 13: Summary of the effects of a 1%-point increase in the profit share

	$\frac{\partial C/Y}{\partial P/Y}$	$\frac{\partial I/Y}{\partial P/Y}$	$\frac{\frac{\partial C}{Y}+\frac{\partial I}{Y}}{\partial P/Y}$	$\frac{\partial X_n/Y}{\partial P/Y}$	Private excess demand
	A	B	A+B	C	D (A+B+C)
Effect at mean level	-1.19	0.40	-0.79	0.35	-0.44
Effect in 2017	-1.18	0.37	-0.81	0.30	-0.51

Once we have determined the overall impact of a 1%-point increase in the profit share on the private demand, we calculate the multiplier to observe the medium-term effects. We compute a national multiplier through the formula.

$$\frac{\partial \hat{Y}/Y}{\partial P/Y} = \frac{\left[\frac{\partial C/Y}{\partial P/Y} + \frac{\partial I/Y}{\partial P/Y} + \frac{\partial X_n/Y}{\partial P/Y}\right]}{1 - \left[\frac{\partial C}{\partial Y} + \frac{\partial I}{\partial Y} - \frac{\partial M}{\partial Y}\right]}$$

Where the numerator is the excess of private demand i.e. the overall effect of a 1%-point increase in the profit share, and the inverse of the denominator is the multiplier, the latter is computed as the elasticity of consumption, investment and imports due to a change in income. We weight the effects of the multiplier by the participation of each component of aggregate demand on the GDP, then:

$$h = \frac{\partial C}{\partial Y} + \frac{\partial I}{\partial Y} - \frac{\partial M}{\partial Y} = e_{C/Y} \cdot \frac{C}{Y} + e_{I/Y} \cdot \frac{I}{Y} - e_{M/Y} \cdot \frac{M}{Y}$$

The multiplier will depend on the magnitude of the elasticities and the composition of aggregate demand, we expect that the multiplier does not drift from the unity, given that Chile is a small and open economy, and the income elasticity of imports and the ratio between imports and GDP could be considerably higher in relation to the marginal propensity to consume and the accelerator effect, diminishing the value of the multiplier.

The effect of income on consumption is given by the weighted average of the marginal propensities to consume of both social classes:

$$C = c_0 + c_w \cdot W + c_p \cdot P$$

If we consider that the profits can be expressed as the GDP at factor cost minus the wage mass and that the latter is the wage share times GDP at factor cost, the average marginal propensity to consume can be expressed as:

$$C = c_0 + (\frac{W}{Y} \cdot (c_w - c_p) + c_p) \cdot Y_{fc}$$

As the average adjusted wage share was 0.32, the marginal propensity to consume out of wages and profits is 0.7 and 0.33 respectively, then the average propensity to consume is 0.45. The elasticities of imports and investment are computed with an ECM for both variables[5].

Table 14: Elasticities, composition of aggregate demand and calculation of multiplier

$e_{C/Y}$	$e_{I/Y}$	$e_{M/Y}$	C/Y	I/Y	M/Y	h	Multiplier	Private excess demand	Total Effect
0.45	1.82	1.82	0.61	0.23	0.31	0.129	1.15	-0.44	-0.50

As we can see in table 14, the high participation of imports in the GDP and the high income elasticity of imports leads to a multiplier of 1.15. So, the total effect of a 1%-point increase in the profit share provokes an aggregate demand contraction of -0.5%-point, taking into account the multiplier effect. And the effect of a redistribution to profits in 2017, will cause a reduction of 0.6%-point in aggregate demand, taking into account the multiplier.

Once we have determined the short and medium-term effect of a redistribution of income on aggregate demand we are going to test the stability of the regime. For stability to exist, it is required that the wage-led policies have a positive effect on investment in order to increase the potential output and that the increase in aggregate demand does not cause inflation. We know that there is a direct and negative effect on investment due to the loss of profitability, but there is also a medium-term and positive effect caused by the decrease in the profit share leads to an expansion of demand, which, at the same time, provokes an increase on investment resulting from the accelerator effect.

Therefore, to test if the accelerator effect overshadows the reduction in profitability the next condition must be achieved:

[5]The regressions are in the statistical appendix 4

$$e_{I/Y} \cdot \frac{\partial \hat{Y}/Y}{\partial P/Y} > e_{I/P_s} \quad \Longrightarrow \quad \frac{\partial \hat{Y}/Y}{\partial P/Y} > \frac{e_{I/P_s}}{e_{I/Y}} \quad \Longrightarrow \quad \frac{\partial \hat{Y}/Y}{\partial P/Y} > 0.59$$

As the condition is not achieved (0.44<0.59), we infer that the regime is not stable throughout the period, since the accelerator effect is not big enough to overshadow the loss of profitability. Therefore, the evolution of investment must rely on other factors and policies in order to increase the stock of capital and the potential GDP. Either way, this finding can be diverse in different sub-periods, which is going to be analyzed in the next section.

Structural breaks

In order to observe the change in the structure of the Chilean economy i.e. changes in the marginal propensities to consume, sensibility of investment to profits, income elasticity of imports, etc., We apply the Bai-Perron test for multiple breakpoints in the best specification for each equation of aggregate demand's components. Later we test the break dates with a Chow break point test and then we search for the best specification in sub-periods.

Consumption functions

For the Consumption function, we apply the Bai-Parron test to the Error Correction Model with five lags (the fifth specification in the previous section), and then we apply the Chow test in order to verify the break date suggested.

Table 15: Structural break test for the consumption function

Bai-Perron Test (Sequential F-statistic determined breaks: 2)				
Break Test	F-statistic	Scaled F-statistic	Critical Value**	Break Date
0 vs. 1*	3.74	67.4	25.8	2009Q2
1 vs 2*	5.85	105.3	27.8	2004Q2-2010Q4
*Significant at the 0.05 level ** Bai-Perron critical values.				

Chow Test (Null Hypothesis: No breaks at specified breakpoints)			
Break Date	F-statistic Prob. F(18,47)	Log likelihood ratio Prob. Chi-Square(18)	Wald Statistic Prob. Chi-Square(18)
20009Q2	0.0012	0.0000	0.0000
2004Q2	0.351	0.038	0.31
2010Q4	0.087	0.002	0.041

We can observe in table 15, that the Bai-Perron test suggests that there is almost one break in the series. For the first hypothesis (0 breaks vs. 1 break), the test suggests that there is one break in the series in 2009Q2. When we apply the Chow test on that date we can reject in all specifications the null hypothesis of no breaks at the specified breakpoint. And for the second hypothesis (1 break vs. 2 breaks), the test suggests that there are two breaks in the series, the first one in 2004Q2 and the latter in 2010Q4. But when we apply the Chow test in order to verify the existence of structural breaks on these dates, we cannot reject the null hypothesis of no

structural breaks with a 95% of confidence interval. Therefore, we can confirm only one structural break in the series in 2009Q2.

Once we know the break date of the consumption series we estimate two consumption functions. The first one is for the period 1996Q1-2009Q1 and the cointegration between consumption and the income of both social classes remains. So, we estimate an error correction model with several lags (one to three) and choose the best specification under the AIC/BIC criteria. For the second sub-period, the cointegration among the variables disappears, so following the methodology of Onaran & Galanis (2012), we estimate the next model in differences:

$$\Delta C_t = \beta_0 + \beta_1 \cdot \Delta W_t + \beta_2 \cdot \Delta P_t + \beta_3 \cdot \Delta C_{t-1}$$

Table 16 exhibits the outcome for both sub-periods. Specifications (1), (2), (3) and (4) correspond to the1996Q1-2009Q1 period, estimated through an Error Correction Model (ECM), with the exception of the third specification that is estimated with an AR(1) to avoid the autocorrelation problem of second specification. On the other hand, specifications (5) and (6) are the model in differences for the 2009Q3-2017Q4 period. We select specification three and six, under the AIC/BIC criteria. We observe that the marginal propensities to consume out of wages and out of profits raises after the period of the financial crisis, but in both periods, we observe that the marginal propensity to consume out of wages is higher than the marginal propensity to consume out of wages. Therefore, in both periods an increase in the wage share will increase aggregate consumption. Additionally, the difference between these two parameters increases after the period of the structural break, then the effect of real wages increases in the second sub-period.

Table 16: Specifications for the relationship between consumption and classes incomes

	1996Q1-2009Q1					2009Q3-2017Q4	
	(1)	(2)	**(3)**	(4)		(5)	**(6)**
C_{t-1}	-0.97***	-1.33***	-1.61***	-1.11***	ΔC_{t-1}		-0.26***
W_{t-1}	0.73***	0.87***	1.02***	0.71***	ΔW_t	1.41***	1.12***
P_{t-1}	0.32***	0.49***	0.59***	0.40***	ΔP_t	0.70***	0.60***
Marginal propensities to consume							
Out of Wages	0.75	0.65	0.64	0.64		1.41	0.89
Out of Profits	0.33	0.37	0.37	0.36		0.70	0.48
N	52	51	50	50		34	34
adj. R^2	0.803	0.879	0.923	0.879		0.792	0.838
AIC	-202.28	-220.28	-218.12	-212.47		-143.53	-150.99
BIC	-190.57	-202.90	-200.92	-189.53		-138.95	-144.88
DW	2.05	1.72	1.94	1.90		2.24	2.08
$CUSUM$	-0.31	0.88	-	0.74		0.60	0.59

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Investment functions

We proceed to apply the Bai-Perron test for structural breaks to the best specification of the previous section. Table 17 highlights that there is only one structural break in the series 2000Q2, which is confirmed by the Chow test.

Table 17: Structural break test for the Investment function

Bai-Perron Test (Sequential F-statistic determined breaks: 1)				
Break Test	F-statistic	Scaled F-statistic	Critical Value**	Break Date
0 vs. 1*	3.17	22.19	21.87	2000Q2
1 vs 2	2.00	14.01	24.17	-
*Significant at the 0.05 level ** Bai-Perron critical values.				

Chow Test (Null Hypothesis: No breaks at specified breakpoints)			
Break Date	F-statistic Prob. F(7,72)	Log likelihood ratio Prob. Chi-Square(7)	Wald Statistic Prob. Chi-Square(7)
2000Q2	0.043	0.019	0.030

We estimate different specification for the investment function. Results are in table 18. Specifications one to three correspond to the 1996Q1-2000Q1 period, while the specifications four to six correspond to the period 2000Q3-2017Q4. We can observe a radical change in the elasticity of investment to profits, due to its value is 1.94 in the first sub-period and 1.08 in the second one. In other words, a 1%-point increase in the adjusted profit share would increase investment by 1.94%-point before 2000Q2 and only by 1.1%-point after that period. Additionally, we observe that the effect of the accelerator of investment becomes higher in the second sub-period.

Once we have determined the elasticity of investment to the profit share and the marginal propensities to consume in sub-periods, we are able to compute the marginal effect of a 1%-point increase in the profit share for each sub-period. To compute this, we evaluate the elasticity in the mean values of each sub-sample and proceed to sum each marginal effect in order to obtain the effect of an increase in the domestic demand profit share.

The impact of an income redistribution on domestic demand is shown in table 19. We can observe that the Chilean domestic demand is wage-led for each sub-period but the magnitude of the impact is different among these. We can observe that the marginal effect of an increase in the profit share is higher in the first sub-sample due to the high value of the elasticity, while the net effect is only -0.04%-point. But when the investment function changed its composition and after 2000Q2 it depends more in the value of the effect of the accelerator of investment, the marginal effect shrinks and the domestic demand becomes more sensitive to changes in distribution of income.

In the third sub-sample we observe an important change in the marginal propensities to consume among social classes. If we add this factor to the reduction of sensitiveness to the profit share in the investment function, then the aggregate demand will become highly sensitive to changes in redistribution. Actually, the change in aggregate demand due to a 1%-point increase in the profit share is -1.12%-point, while in the others sub-periods this value does not exceed the unity.This change of the effect of redistribution can be attributed to two factors: (1) an increase

Table 18: Different specifications for the investment function in sub-periods

	1996Q1-2000Q1			2000Q3-2017Q4		
	(1)	(2)	(3)	(4)	(5)	(6)
ΔPs_t	-0.52	-2.54***		-0.95**	-0.43	
ΔPs_{t-1}	3.71**	3.82***	2.27**	0.79*	0.66*	0.68*
ΔY_t	3.25***	3.10***	4.03***	2.14***	2.13***	3.21***
ΔY_{t-1}	-2.16***	-2.22***	-2.26***	-1.54***	-1.66***	-1.13***
Δpc_t	-0.10			-0.17***	-0.17***	-0.20***
Δpc_{t-1}	-0.20			0.15***	0.12***	0.15***
ΔI_{t-2}		0.34**	0.16*		-0.16***	
ΔI_{t-3}			0.48**			0.37***
Profit share elasticity of investment						
e_{ps}	3.71	1.94	6.31	-0.24	0.57	1.08
N	15	14	13	70	70	70
adj. R^2	0.912	0.960	0.952	0.892	0.909	0.910
AIC	-41.62	-48.89	-43.60	-210.41	-221.89	-222.94
BIC	-36.66	-45.06	-40.21	-194.67	-203.90	-207.20
DW	1.22	2.00	1.58	1.83	1.60	1.91
$CUSUM$	0.92	0.57	0.34	0.42	0.45	0.40

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

in the differences in the marginal propensities to consume which arises in the second sub sample; and (2) the increase in the inequality in the functional income distribution, due to the quotient between consumption and the wage bill becomes higher in the second sub-period, intensifying the marginal effect of a redistribution of income to wages and shrinking the effect of profits, increasing (in absolute terms) the net effect.

Table 19: Summary of the effects of a 1%-point increase in the profit share

	$\frac{\partial C/Y}{\partial P/Y}$	$\frac{\partial I/Y}{\partial P/Y}$	$\frac{\frac{\partial C}{Y}+\frac{\partial I}{Y}}{\partial P/Y}$
	A	B	A+B
1996Q1-2000Q1	-0.89	0.86	-0.04
2000Q3-2009Q1	-1.04	0.39	-0.65
2009Q2-2017Q4	-1.51	0.39	-1.12

Intern prices and Import functions

In order to analyze the changes in the parameters of the import function, first we must analyze changes in the intern prices dynamics. When we apply the Bai-Perron test to the best specification of the intern price function, we obtain that there is not structural breaks in the series (See statistical appendix 5). Then we proceed to check for structural breaks in the import function.

Table 20: Structural break test for the Import function

Bai-Perron Test (Sequential F-statistic determined breaks: 2)				
Break Test	F-statistic	Scaled F-statistic	Critical Value**	Break Date
0 vs. 1*	3.62	43.51	26.38	2008Q2
1 vs. 2*	6.01	72.07	28.56	2012Q4
2 vs. 3	0.67	7.99	29.62	-
*Significant at the 0.05 level ** Bai-Perron critical values.				

Chow Test (Null Hypothesis: No breaks at specified breakpoints)			
Break Date	F-statistic Prob. F(12,61)	Log likelihood ratio Prob. Chi-Square(12)	Wald Statistic Prob. Chi-Square(12)
20008Q2	0.0002	0.0000	0.0000
2012Q4	0.0081	0.0005	0.0021

Table 21: Different specification for the import function in sub-periods

	1996Q1-2008Q1			2008Q3-2012Q3		2013Q1-2017Q4		
	(1)	**(2)**	(3)	(4)	**(5)**	(6)	(7)	**(8)**
M_{t-1}	-0.20***	-0.22***	-0.30***					
ϵ_{t-1}	0.33***	0.35***	0.49***					
$\frac{p}{P_m}_{t-1}$	0.22***	0.24***	0.32***					
$\Delta\epsilon_t$				2.46***	2.17***	2.14**	1.34**	1.69***
ΔM_{t-1}					0.52	0.50		
$\Delta\frac{p}{P_m}_{t-1}$				0.43	1.06*	1.04*		
$\Delta\frac{p}{P_m}_{t-2}$							0.93*	1.09**
ΔY_t						0.08		0.69**
price ratio elasticity of imports								
$e_{\frac{p}{P_m}}$	1.1	1.09	1.07	0	1.06	1.04	0.93	1.09
N	47	46	46	17	17	17	20	20
adj. R^2	0.748	0.816	0.776	0.408	0.460	0.416	0.249	0.445
AIC	-175.34	-179.85	-174.88	-25.20	-26.01	-24.04	-49.44	-54.68
BIC	-158.69	-163.39	-152.94	-22.70	-22.68	-19.88	-46.45	-50.70
DW	2.29	2.11	2.13	1.44	1.95	1.92	1.88	1.92
$CUSUM$	0.86	-	1.10	0.53	0.50	0.23	0.28	0.62

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

When we apply the Bai-Perron test to the import function we obtain two structural breaks, the first one in 2008Q2 and the second in 2012Q4. As we can see in table 20 when we apply the Chow test to these dates we reject the null hypothesis of no structural breaks in the series.

Results are shown in table 20. Specifications one, two, and three correspond to the 1996Q1-2008Q1 period. The cointegration of the ECM remains in the first sub-period, so specification (1) is an ECM with two lags. Specification (2) is the ECM estimated through the Cochrane-Orcutt methodology to eliminate the autocorrelation in the error term. Specification (3) is an ECM with three lags. The next specifications are models in differences due to the loss of cointegration in the series. Specification four and five correspond to the period between 20008Q3-2012Q3, and specification six, seven, and eight are from the period 2013Q1 to 2017Q4.

As we can see in table 21, the chosen specifications were the numbers two, five and eight for each sub-period, since they have the best value of the AIC/BIC criteria. As we can see the elasticity of imports in relation to the ratio between intern and import prices remains stable through the sub sample. And if we consider that the intern price function does not have structural breaks, the elasticity of imports to real unit labor cost must be stable throughout the sample, but the marginal effect should change if the mean values of the sample changes through time.

Export functions

The Bai-Perron test suggest that there is one structural break in the export function as indicated in table 22. When we apply the Chow test to the date indicate by the Bai-Perron test we reject the null hypothesis of no structural break, so we proceed to estimate the export function in two sub-periods.

Table 22: Structural break test for the Export function

Bai-Perron Test (Sequential F-statistic determined breaks: 1)				
Break Test	F-statistic	Scaled F-statistic	Critical Value**	Break Date
0 vs. 1*	8.91	53.44	20.08	2004Q2
1 vs 2	1.27	6.64	22.1	-
*Significant at the 0.05 level ** Bai-Perron critical values.				

Chow Test (Null Hypothesis: No breaks at specified breakpoints)			
Break Date	F-statistic Prob. F(6,72)	Log likelihood ratio Prob. Chi-Square(6)	Wald Statistic Prob. Chi-Square(6)
2004Q2	0.000	0.000	0.000

In the Table 23 we can see the different specification for the export function through time. Specifications one to four correspond to the 1996Q1-2004Q1 period and the specification five to eight correspond to the 2004Q3-2017Q4 period. We can observe that there is a negative relationship between real unit labor cost and export for both sub-periods, but its value is lower in the second sub-sample. Nevertheless, we cannot conclude that the marginal effect of higher profits will be bigger in the first sub-sample due to it depending on the mean values of the

sample in each sub-period.

Table 23: Different specifications for the export function in sub-periods

	1996Q1-2004Q1				2004Q3-2017Q4			
	(1)	**(2)**	(3)	(4)	(5)	(6)	(7)	**(8)**
$\Delta RULC_t$	-0.49*	-0.44*	-0.67	-0.71	-0.22**	-0.22**	-0.24***	-0.25***
$\Delta\epsilon_t$	-0.59***	-0.57***	-0.54**	-0.42*	-0.11	-0.11		-0.11
$\Delta\epsilon_{t-1}$	0.53***	0.38**	0.78***		-0.01		-0.02	
$\Delta Y'_t$	-3.41***	-3.81***			0.19	0.19		
$\Delta Y'_{t-1}$	3.74***	2.65***	6.79***	5.64***	0.51**	0.50**	0.43**	0.44**
$\Delta Y'_{t-2}$	2.56***	1.88**	0.50	0.57	0.80***	0.80***	0.77***	0.75***
ΔX_{t-1}	-0.36**	-0.45***	0.17	-0.09	-0.60***	-0.60***	-0.65***	-0.65***
ΔX_{t-2}		-0.20**	-0.03	-0.21	-0.23*	-0.23*	-0.24*	-0.23*
Real unit labor cost elasticity of exports								
e_{RULC}	-0.36	-0.27	0.00	0.00	-0.12	-0.12	-0.13	-0.13
N	30	30	30	30	54	54	54	54
adj. R^2	0.915	0.930	0.777	0.673	0.559	0.569	0.567	0.572
AIC	-131.50	-137.04	-102.70	-91.89	-203.27	-205.26	-205.81	-206.43
BIC	-120.29	-124.42	-91.49	-82.08	-185.36	-189.35	-191.89	-192.51
DW	2.17	2.10	1.98	2.19	1.93	1.94	1.84	1.86
$CUSUM$	0.49	0.58	0.42	0.77	0.60	0.68	0.68	0.66

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Total effects

As we have found the structural breaks in the consumption, investment, exports, imports and intern price series and estimated their relative elasticities for each sub-period, we are able to compute the aggregate effect of an income redistribution in Chile. We are able to find and test five structural breaks; therefore, there are six periods to compute the marginal effect of a redistribution. These periods are: (1) 1996Q1-2000Q1, (2) 2000Q3-2004Q1, (3) 2004Q3-2008Q1, (4) 2008Q3-2009Q1, (5) 2009Q3-2012Q3 and (6) 2013Q1-2017Q4. In order to compute the marginal effect, we evaluate the elasticity value in the mean of each sub-sample, so the marginal effect of consumption (for example) could be different between sub-periods even though the marginal propensities to consume were the same, due to that the mean value of the variables changes over time.

In table 24, we can see the impact of a 1%-point increase in the profit share for all the components of aggregate demand for the six sub-samples and the excess of private demand for each period. We can observe that the effect of a 1%-point increase in the profit share always has a negative impact on the Chilean domestic demand, therefore the intern demand in Chile is wage-led for the period between 1996 and 2017. But this impact is very different among sub-periods. For the first sub-period (1996Q1-2000Q1), the impact of a 1%-point increase in the profit share leads to a contraction of 0.04%-point in the aggregate demand, while in the period between 2009Q3-2012Q3 the impact rises to a contraction of 1.14%-point in aggregate demand.

As we can see in table 24, the effect of an income redistribution in domestic demand is relatively high (above -0.5%-point in absolute value) excluding the first sub-period. We can observe that the marginal effect on investment due to an increase in the profit share is almost the same that the decrease in consumption, so the net effect on domestic demand is virtually non-existent in the first sub-sample. But after the break in the elasticity in 2002Q2, the investment function is less constrained by profitability and the accelerator effect becomes the main constrain of investment (see table 19). This leads to the marginal effect of a redistribution on domestic demand that rises, especially in the last two sub-samples where exists a change in the propensities to consume of both social classes which makes the effect of redistribution stronger.

Table 24: Summary of the effects of a 1%-point increase in the profit share in sub-periods

	$\frac{\partial C/Y}{\partial P/Y}$	$\frac{\partial I/Y}{\partial P/Y}$	$\frac{\frac{\partial C}{Y}+\frac{\partial I}{Y}}{\partial P/Y}$	$\frac{\partial X/Y}{\partial P/Y}$	$\frac{\partial M/Y}{\partial P/Y}$	$\frac{\partial Xn/Y}{\partial P/Y}$	Private excess demand
	A	B	C(A+B)	D	E	F(D+E)	C+F
1996Q1-2000Q1	-0.89	0.86	-0.04	-0.21	0.11	0.31	0.28
2000Q3-2004Q1	-0.90	0.40	-0.50	-0.26	0.12	0.37	-0.12
2004Q3-2008Q1	-1.14	0.36	-0.78	-0.20	0.15	0.35	-0.43
2008Q3-2009Q1	-1.16	0.45	-0.72	-0.18	0.18	0.36	-0.36
2009Q3-2012Q3	-1.52	0.38	-1.14	-0.16	0.15	0.31	-0.83
2013Q1-2017Q4	-1.50	0.40	-1.10	-0.13	0.13	0.26	-0.85

The effect of redistribution on domestic demand can be overshadow by the effect of redistribution on the trade balance. As we can see in the first sub-period the effect on trade balance overshadows the effect of domestic demand, turning the aggregate demand in Chile in a profit-led regime. Actually, the effect of a 1%-point increase in the profit share leads to an expansion of aggregate demand by 0.28%-points. This period is the only period where the aggregate demand is in a profit-led regime.

As we can see in table 24, the effect of exports is bigger than the effect on imports for every sub-period. But since the commodity boom the effect on exports had been diminishing through time. In relation to imports, the effect of an income redistribution has been diminishing since the world financial crisis in 2007. Therefore, the negative effects of a redistribution on trade balance has been diminishing since world financial crisis, increasing the negative effect of an increase in the profit share in aggregate demand. The effects of a 1%-point increase in the profit share since 2013 is a decrease of 0.85%-point on the aggregate demand. And if we consider that the multiplier is stable through time, the effect will increase by 0.97%-point. Therefore, since the year 2000 the aggregate demand of Chile had been in a wage-led regime, furthermore, the effect of a 1%-point increase in the profit share leads to a contraction of 1%-point in the aggregate demand in the last four years (if we take into account the multiplier effect).

As we observe in the investment function, the structural breaks indicate an important change in the sensibility of investment. After the break, the investment function is heavily sensitive to the accelerator effect rather than the profitability. Therefore, in order to achieve the stability condition (i.e. the accelerator effect overshadows the profitability effect), the next condition must be achieved:

$$\frac{\partial \hat{Y}/Y}{\partial P/Y} > \frac{e_{I/P_s}}{e_{I/Y}} \quad \Longrightarrow \quad \frac{\partial \hat{Y}/Y}{\partial P/Y} > \frac{1.08}{3.3} \quad \Longrightarrow \quad \frac{\partial \hat{Y}/Y}{\partial P/Y} > 0.33$$

So, any change in aggregate demand due to a change in income distribution that is higher than 0.33% will cause the investment to increase, thanks to the accelerator effect. And as we can see after the second sub-sample (2004Q2) all the total effects are higher than that value, which means that the wage-led regime is stable over time, given the fact that the accelerator effect overshadows the loss of profitability, thus increasing investment, the capital stock and therefore, the potential output. This guarantees that any increase in demand does not cause fast increase in prices, and the distributive policies warrant the expansion of potential output.

Preliminary conclusions and policy implications

Our research has highlighted the role of inequality, measured as the functional income distribution, in the macroeconomic performance of Chile, pinpointing the effect of an income redistribution on the growth of aggregate demand. Our empirical estimations of the post-Kaleckian and post-Keynesian model offer two major contributions: first, an estimation for the period of 1996-2017, where we came to the conclusion that a 1%point increase in the profit share would cause a contraction of domestic aggregate demand of almost 0.44%-point. If we consider the multiplier effect the 1%-point increase in the profit share would result in a decline of aggregate demand of 0.5%-points. Therefore, we can conclude that the Chilean economy is in a wage-led regime in the period analyzed.

The analysis in sub-periods of an income redistribution indicates that the domestic demand was wage-led in all sub-periods. Our empirical findings spot that in the period 1996Q1-2000Q1, the Chilean aggregate demand was in a profit-led regime due to the high sensitivity of investment to profitability and the differences between the marginal propensities to consume, which were relatively small. Therefore, if we take into account the effect of net exports, the aggregate demand becomes profit-led. But after the break in the investment function the aggregate demand is wage-led in all sub-periods but its magnitude is different across time, increasing it effect (in absolute value) after the world financial crisis.

These results have important implications for policy and theory. Over the last 17 years, Chile has been immersed in a wage-led regime, which implies that the policies that promote the increase in the profit share, as a reduction in the tax rate of the capital or on the top-income workers, would have detrimental effects on the expansion of aggregate demand. Actually, the policies that aim to increase the profitability of firms will not have the expected effect as investment in Chile is more sensitive to the accelerator effect than to profitability. On the other hand, the policies that address inequality would have beneficial effects on economic performance in Chile, due to the domestic demand (consumption and investment) depends on the demand level of the working class. Consequently, a labor reform that reaches an increase in the bargaining power of the working class, minimum wage policies, or labor union protection which would be expressed in an increase in the wage share, should encourage aggregate demand and capital accumulation.

But this type of policies must be complemented with other types of policies that guarantee the stability of the regime, especially the ones who aim to increase investment. Therefore, policies

as labor capacitation, increases in public investment (which, in turn, can produce crowding in effects) or an active government policy of R&D are essential in order to guarantee the coincidence of higher economic growth and higher wages due to incentive private investment and the expansion of potential output. The initial increase in income due to a redistribution of income would mean higher public revenues that can secure funding of those policies.

It is paramount to highlight the fact that an increase in the wage share and a reduction of inequality will not solve, by itself, the development problem. The productivity gap is also related to the level of inequality, but its analysis is outside our interest framework in this work. Structural change is a key element in the problem of development, and this could affect the parameters of the aggregate demand, especially the elasticity of imports, exports and the role of investment in the demand, intensifying the actual regime or shifting it, in both cases redistribution policies implemented by the government must be inserted in a plan of structural change in order to try to address the development problems in Chile.

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Appendix

1. T-tests for the difference of means and variances due to the change in data specification*

Variable	Test	1996-2009 (n=52)	2010-2017 (n=32)	t-statistic	p-value
q-o-q growth	Equal mean	0.031 (0.083)	0.006 (0.094)	1.2194	0.2275
	Equal variance	0.031 (0.083)	0.006 (0.094)	0.7620	0.2837
m-o-m growth	Equal mean	0.008 (0.534)	0.005 (0.060)	0.2797	0.7807
	Equal variance	0.008 (0.534)	0.005 (0.060)	0.7823	0.4225

*All specifications are tested with a 99% level of confidence

2. Other consumption specifications

(a) Long-term relationship between consumption of durable goods (CDG) and income.

	(1)	(2)	(3)	(4)	**(5)**	(6)	(7)	(8)
CDG_{t-1}	-0.52***	-0.56***	-0.34***	-0.18*	-0.25***	-0.15	-0.14	-0.17*
W_{t-1}	0.30***	0.26**	0.22*	0.15	0.21**	0.16*	0.13	0.12
P_{t-1}	0.35***	0.43***	0.24**	0.15	0.15*	0.10	0.11	0.15*
Long run elasticities (marginal propensities to consume)								
Out of Wages	0.59	0.47	0.65	-	0.84	-	-	-
Out of Profits	0.68	0.76	0.71	-	0.61	-	-	0.90
N	87	86	85	84	83	82	81	80
adj. R^2	0.727	0.732	0.782	0.829	0.893	0.907	0.914	0.912
AIC	-157.89	-154.25	-166.20	-181.60	-219.10	-225.03	-226.80	-220.92
BIC	-143.09	-132.16	-136.89	-145.14	-175.56	-174.49	-169.34	-156.60
DW	1.92	1.85	2.33	1.52	1.64	2.20	2.11	1.97

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(b) Long-term relationship between consumption of non-durable goods (CNDG) and income.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$CNDG_{t-1}$	-0.7***	-0.9***	-0.3**	-0.2	-0.3**	-0.3**	-0.3*	-0.4***
W_{t-1}	0.5***	0.7***	0.3**	0.2	0.2**	0.2**	0.2**	0.3***
P_{t-1}	0.1**	0.2***	0.0	0.0	0.0	0.0	0.0	0.1**
Long run elasticities (marginal propensities to consume)								
Out of Wages	0.81	0.74	0.83	-	0.80	0.78	0.78	0.70
Out of Profits	0.13	0.18	-	-	-	-	-	-
N	87	86	85	84	83	82	81	80
adj. R^2	0.692	0.755	0.827	0.866	0.924	0.925	0.922	0.927
AIC	-298.0	-310.3	-332.5	-347.7	-389.2	-382.8	-371.6	-372.0
BIC	-283.2	-288.2	-303.2	-311.2	-345.7	-332.2	-314.1	-307.7
DW	1.77	1.57	2.20	1.33	1.83	2.03	1.98	1.96

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(c) Long-term relationship between consumption of services (CS) and income.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CS_{t-1}	-0.9***	-1.2***	-0.8***	-0.4**	-0.6***	-0.5***	-0.5***	-0.6***
W_{t-1}	0.6***	0.8***	0.5***	0.2**	0.4***	0.4***	0.4***	0.3**
P_{t-1}	0.4***	0.5***	0.3***	0.2**	0.2***	0.2***	0.2***	0.2***
Long run elasticities (marginal propensities to consume)								
Out of Wages	0.68	0.65	0.66	0.59	0.65	0.66	0.65	0.62
Out of Profits	0.41	0.43	0.41	0.43	0.42	0.42	0.42	0.44
N	87	86	85	84	83	82	81	80
adj. R^2	0.686	0.785	0.827	0.879	0.929	0.927	0.925	0.938
AIC	-330.3	-358.2	-369.0	-391.6	-429.6	-422.9	-412.6	-420.4
BIC	-315.5	-336.1	-339.6	-355.1	-386.0	-372.4	-355.2	-356.1
DW	1.74	1.63	2.31	1.39	1.92	1.98	2.11	1.61

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3. Mean values of the sample

Period	C/W	C/P	I/P	X/Y	M/Y	$RULC$	Y_{FC}
1996Q1-2017Q4	2.177	1.009	0.376	0.34	0.31	0.29	0.91
2017Q1-2017Q4	2.158	0.997	0.344	0.287	0.27	0.29	0.91
1996Q1-2000Q1	2.047	1.122	0.443	0.271	0.28	0.32	0.91
2000Q3-2004Q1	2.046	1.104	0.373	0.336	0.30	0.32	0.91
2004Q3-2008Q1	2.297	0.899	0.334	0.427	0.31	0.26	0.92
2008Q3-2009Q1	2.378	0.97	0.413	0.392	0.40	0.26	0.91
2009Q3-2012Q3	2.205	0.927	0.349	0.37	0.33	0.27	0.92
2013Q1-2017Q4	2.226	0.997	0.37	0.303	0.30	0.28	0.91

4. Multiplicator estimation

(a) Investment

	(1)	(2)	(3)	(4)	**(5)**	(6)	(7)	(8)
I_{t-1}	-0.34***	-0.22***	-0.12*	-0.12**	-0.17***	-0.13**	-0.14**	-0.13*
Y_{t-1}	0.57***	0.37***	0.21*	0.23**	0.31***	0.25**	0.25**	0.24*
	Long run elasticities (accelerator effect)							
$e_{I/Y}$	1.66	1.65	1.73	1.91	1.82	1.85	1.85	1.88
N	87	86	85	84	83	82	81	80
adj. R^2	0.831	0.872	0.890	0.927	0.938	0.941	0.942	0.940
AIC	-232.23	-250.52	-258.16	-288.47	-298.25	-296.22	-290.41	-285.09
BIC	-222.37	-235.79	-238.62	-264.16	-269.22	-262.53	-252.10	-242.22
DW	1.77	2.14	2.04	1.99	1.76	1.99	1.98	1.84
$CUSUM$	1.14	0.56	0.42	0.39	0.69	0.41	0.49	0.74

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(b) Imports

	(1)	(2)	(3)	**(4)**	(5)	(6)	(7)	(8)
M_{t-1}	-0.13*	-0.17**	-0.11	-0.17***	-0.13**	-0.13*	-0.12	-0.13*
Y_{t-1}	0.22*	0.29**	0.17	0.31***	0.24**	0.24*	0.21	0.23*
Long run elasticities (income elasticity of imports)								
$e_{M/Y}$	1.66	1.67	1.59	1.82	1.81	1.82	1.77	1.81
N	87	86	85	84	83	82	81	80
adj. R^2	0.136	0.164	0.230	0.517	0.522	0.508	0.512	0.490
AIC	-258.93	-256.24	-257.91	-292.69	-287.28	-278.71	-273.32	-268.05
BIC	-249.07	-241.52	-238.37	-268.38	-258.26	-245.02	-235.01	-225.18
DW	1.65	1.87	1.83	1.81	2.00	1.97	1.91	1.91
$CUSUM$	0.32	0.39	0.43	0.40	0.44	0.52	0.64	0.61

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5. Structural break test for the intern price function

Bai-Perron Test (Sequential F-statistic determined breaks: 0)				
Break Test	F-statistic	Scaled F-statistic	Critical Value**	Break Date
0 vs. 1	2.38	11.92	18.23	-
*Significant at the 0.05 level ** Bai-Perron critical values.				