LUND UNIVERSITY
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Master in Economic Development and Growth

Monetary policy and functional income distribution, 1875-2010

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Abstract: This paper examines the existence of a link between changes in monetary policy and changes in functional income distribution using a panel of up to fourteen countries over the period 1875-2010. It also investigates the potential transmission channels (changes in asset prices, wages, unemployment, and inflation) that explain such a phenomenon. The evidence indicates the presence of a correlation between monetary policy and functional income distribution over the whole period of analysis that is robust across different estimation methods. The effect of monetary policy is not factor biased as its relationship with the capital share of the total economy has changed over time. Indeed, in some periods monetary policy indicators (short-term interest rates and deviations from a monetary policy rule) are correlated with more income being allocated as capital income, where as in others they are associated with a lower capital share.

Key words: Income distribution, capital share, monetary policy, interest rate.

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1. Introduction

Over the recent years, unconventional monetary policy has directed a lot of attention to the effects of monetary policy on inequality. In fact, a number of recent studies have focused on the impact of quantitative easing on personal income inequality, obtaining mixed results (see, *e.g.*, Coibion et al., 2012 and Montecino and Epstein, 2015). The distribution of income between capital and labor has also been analyzed but in a lesser extent. Focusing on the evolution and nature of functional income distribution is important for several reasons. First, because capital ownership is unevenly distributed, the share that each factor gets from production is directly linked to the personal distribution of income. Second, factor shares are related to economic efficiency, for the same variables that by definition determine functional income distribution affect the ability of the economy to absorb shocks and the associated macroeconomic volatility (European Commission, 2007). Third, functional income distribution has also important implications for economic growth since the marginal propensity to save and consume out of capital income is different than that of labor income; hence, changes in factor shares affect aggregate consumption and investment dynamics (European Commission, 2007).

Most of the research related to functional income distribution has tried to account for the decrease of the labor share observed over the last decades by focusing on the role of technological change, globalization, financialization, and bargaining power. This paper, while related to those studies that have pointed to financialization as a driver of the evolution of factor shares, takes a more general approach by investigating the existence of a short-run link between monetary policy and functional income distribution. From a post Keynesian perspective, monetary policy affects firms' overhead costs via alterations of interest payments. Thus, firms could respond by modifying the markup of prices over costs or by adjusting costs, which could potentially affect the distribution of income between capital and labor. Under a new Keynesian approach, once one recognizes that the real world is not characterized by perfect competition and that prices do not adjust instantaneously to clear markets all the times, the equality between the marginal productivity and the return on factors does not necessarily hold. Indeed, in a number of cases, the wage needs not be equal to the marginal product of labor and the return on capital is not always equivalent to the marginal productivity of capital (Blanchard, 1998; Gordon, 1990; Piketty, 2014). A natural implication is that functional income distribution is determined not only by technology but also by other elements that affect the wedge between factors' marginal productivity and compensation. To the extent that the sensitivity of labor income and profits with respect to the monetary policy stance is different, monetary policy shocks can alter the distribution of income between capital and labor.

Nonetheless, the overall effect of monetary policy on income distribution cannot be determined a priori because of the presence of channels moving in countervailing directions (Bernanke, 2015). On theoretical grounds, both the post Keynesian and the new Keynesian perspectives do not predict an unambiguous effect. In policy discussions, this issue is old and new. As Montecino and Epstein (2015) state, in previous historical cases tight monetary policy was accused of transferring income from poor to rich people, while easy monetary policy is currently being blamed of doing the same in the context of quantitative easing. This paper studies whether changes in short-term interest rates and changes in the monetary policy stance contribute to explain variations in capital shares using a panel of up to fourteen countries over the period 1875-2010. The paper also tests if certain transmission channels explain the link between monetary policy and factor shares. Such channels are given by the short-term dynamics through which monetary policy affects prices, wages, and unemployment as described by the Phillips curve, and by the reaction of asset prices to monetary policy.

This study contributes to the existent literature in three ways. First, it expands the empirical literature linking monetary policy and functional income distribution in the cross-section and the time dimensions, as well as in the generality of the analysis, compared to other investigations. Previous studies have focused on narrower concepts of functional income distribution (*e.g.*, Argitis and Pitelis, 2001), experiences of individual countries (*e.g.*, Hein and Schoder, 2011), and have used data corresponding to the last decades (*e.g.*, Dünhaupt, 2013). Second, the paper adopts a general empirical strategy that allows inferring whether or not the evidence is broadly consistent with the post and the new Keynesian frameworks. Third, as a side-effect contribution, this study also broadens the evidence on the determinants of functional income distribution in the time dimension. Beyond these contributions, the ultimate aim of this study, which provides an analysis over the long run that does not focus on specific historical outcomes, is motivating further theoretical and empirical research that could potentially change our understanding on the distributional effects of monetary policy. Indeed, the long time span covered in this research, besides providing a quite unique perspective, allows the definition of sub-samples that show that monetary policy has benefited capital in some periods whereas in others it has acted in favor of labor income.

The remainder of the paper is structured as follows. Section 2 reviews the theoretical framework in which functional income distribution and monetary policy are linked, while section 3 presents related previous empirical research. The data and the empirical strategy are presented in sections 4 and 5, respectively. Section 6 contains the results of this investigation along with robustness checks and a discussion on the findings. Section 7 offers some concluding remarks.

2. Theory

2.1. Functional income distribution

The functional distribution of income reflects how income is allocated between labor and capital. While the labor share is the proportion of income that is distributed to workers, representing the remuneration of employees in value added, the capital share is the proportion of national income that is allocated as capital income and it consists of interests, profits, dividends, and realized capital gains (Bengtsson and Waldenström, 2015). Giovannoni (2014a) surveys some of the most important theoretical frameworks that deal with the functional distribution of income. Arguably, the most important perspectives toward factor shares are the neoclassical and post Keynesian approaches.

In neoclassical economics, functional income distribution is determined by technology and preferences. Under full capacity utilization and the clearing of markets, the marginal product of labor, given by the technology available, determine labor demand, while preferences determine labor supply (Stockhammer, 2009). Therefore, the evolution of functional income distribution depends on the nature of technological change. If technological change is capital or labor-augmenting, in the sense that just one of the production factors is affected, more income is expected to be allocated to the augmented factor. On the other hand, technical change can be factor biased in the sense that it can affect the marginal productivity of each factor at different rates (Giovannoni, 2014a). The elasticity of substitution between labor and capital plays an important role. The Cobb-Douglas production function assumes fixed output elasticities of labor and capital, implying a unit elasticity of substitution between labor and capital. In the case of perfect competition, factor shares are constant and equivalent to the elasticity of output with respect to each factor. On the other hand, the constant elasticity substitution production function allows a non-unity elasticity and, hence, a non-constant functional income distribution (Giovannoni, 2014a).

The post Kenynesian perspectives on income distribution include the theoretical frameworks developed by Kalecki, Kaldor, and Pasinetti, among others. Kalecki's perspective on functional income distribution, which is addressed within his theory of economic dynamics, is directly relevant to this paper. For Kalecki, income distribution is linked to the ability of capitalists to pass wage increases onto prices; it is exogenous and affects aggregate demand, which in turn determines the level of output. Therefore, the degree of competition and the bargaining power of the actors are important elements (Giovannoni, 2014a). The most important assumptions are the existence of two classes (capitalists and workers), the presence of imperfect competition, and the assumption that the economy is not in full employment. If workers consume all their wages, profits are equal to the sum of capitalists' consumption and investment. Since capitalists may decide the level of consumption and investment, and not the level of their earnings, causality runs from expenditure to profits. Thus, capitalists earn what they spend (Kalecki, 1968).[1]

Now, given that profits are the difference between sales proceeds, which are prime costs marked up by a factor that reflects the degree of monopoly, and total costs, the wage share is inversely linked to the degree of monopoly. Hence, the more competitive the industry, the lower the degree of monopoly, and the higher the labor share. However, the share of profits is given because the market structure and the decision-making power allow capitalists to determine it. Consequently, wages, profits, and output (and hence income shares) are determined by capitalists' consumption and investment along with the distribution factors (elements determining the distribution of income such as the degree of monopoly). Kalecki distinguishes two possible consequences of a wage increase: either the wage increase is offset with a corresponding increase in prices that leaves the real wage unchanged or the capitalists accept a decline in the capital share.

[1] Other post Keynesian authors have also reached the conclusion that workers cannot influence the distribution between wages and profits, but capitalists do. For instance, Kaldor (1961) and Pasinetti (1962) introduced other elements to the analysis such as the class struggle and the propensity to save and reached to similar interpretations (Palley, 2005).

Finally, it is worth mentioning that a new Keynesian perspective combines neoclassical and Keynesian approaches that are compatible with post Keynesian theories of income distribution. For instance, Blanchard (1998) develops a model of employment, unemployment, and capital accumulation, where the marginal product equals wage (a neoclassical characteristic), but a wedge between the two arising from imperfections in the goods and/or the labor market is allowed exist, influencing income distribution. For instance, monopoly power in the goods market may lead to a markup of price over marginal cost (a post Keynesian feature). In the labor market, if unions force firms to employ more workers than they would want at a given wage, the product of the marginal worker is lower than his wage.

2.2. Monetary policy

Monetary policy is an important tool for influencing the real economy, at least in the short run. The standard theoretical explanation considers that monetary policy alters interest rates, which in turn affect the components of aggregate demand. Indeed, the most emphasized transmission channel is that short-term interest rates affect the cost of capital and spending on durable goods. However, this mechanism alone cannot explain the magnitude of the effects of monetary policy on the real economy. For that reason, it has been complemented by what is known as the credit channel of monetary transmission, which, according to Bernanke and Gertler (1995), is an enhancement mechanism rather than an independent channel.

Bernanke and Gertler (1995) explain that the effects of monetary policy on interest rates are amplified by endogenous changes, in the same direction, in the external finance premium (the difference in costs between external and internal funds). There are two mechanisms that can explain the link between monetary policy and the external finance premium: the balance sheet channel and the bank lending channel. The balance sheet channel denotes that monetary policy shifts can affect the financial position of borrowers, both directly and indirectly. A monetary tightening directly affect borrowers' balance sheets because it increases interest expenses, reducing profits. Besides, such policy is associated with declining asset prices that shrink the value of the borrower's collateral. In addition, tight monetary policy affects borrowers' balance sheets indirectly by creating a financial gap that erodes the firm's net worth and creditworthiness because of the decline in revenues associated with a decrease in demand. On the other hand, the bank lending channel affects the external finance premium because a monetary tightening is likely to increase banks' cost of funds, reducing the supply of intermediated credit.

As we will see, the transmission mechanisms of monetary policy imply perturbations on variables that are constituent parts of the functional distribution of income. Wages, prices of goods, and unemployment can be understood in the context of the Phillips curve. On the other hand, stock prices, which determine capital gains and stock dividends, illustrate the link between monetary policy and asset prices.

2.2.1. Phillips curve

Monetary policy influences both inflation and unemployment in the framework of the Phillips curve. Phillips' (1958) original paper showed that between 1861 and 1957 there was a negative relation between the unemployment rate and the growth rate of the nominal wage rate in Britain. His hypothesis states that when demand for labor is high and unemployment is low wages are expected to increase. However, the relationship is non-linear since workers are not willing to accept decreases in wages when the demand for labor is low and unemployment is high, which forces employers to dismiss employees, increasing unemployment. If one assumes that inflation increases whenever the growth rate of wages is greater than the growth rate of productivity, there is a negative relationship between inflation and unemployment (Gordon, 2011).

Although there is a consensus regarding the presence of an inexorable trade-off between inflation and unemployment in the short run, explained by price stickiness (Mankiw, 2000), the shape of the long-run Phillips curve has been much debated. In the short run, an increase in inflation induces additional output and employment because suppliers do not know with certainty if the increase in demand is permanent or temporary, and they could misleadingly believe that price and wage increases reflect an increase in demand for their particular product or service (Gwartney et al., 1985). However, Friedman, Phelps, and Lucas, supporting the long-run monetary neutrality (average inflation has no effect on average output), argued that this trade-off does not exist in the long run because if policy makers try to exploit it for an extended period of time people will adapt their expectations and their response to the situation of rising prices and wages (Gordon, 2011; Romer, 2012). Thus, the long-run Phillips curve is vertical, showing that there is no permanent, sustainable trade-off between inflation and unemployment (Gwartney et al., 1985).

After 1975, the Phillips curve literature splits into two branches. One branch brought back the trade-off by explaining that the inflation rate is dominated by persistence in the formation of expectations, contracts have fixed price and duration, and there are lags between input and final output prices. The other branch sustains that expectations can jump in response to current and anticipated changes in policy, and the inflation-unemployment trade-off only materializes when expected inflation is different from actual inflation (Gordon, 2011). Within this latter branch, the new Keynesian Phillips curve incorporates forward-looking inflation expectations and a measure of aggregate marginal costs in the presence of nominal price rigidities. Price formation takes place in the framework of monopolistic competition in which the price is a markup over marginal costs, and monetary policy affects inflation through its effects on marginal costs (Hornstein, 2008).

2.2.2. Stock prices

As mentioned earlier, the transmission of monetary policy partly comes from its influence on longer-term interest rates and stock prices, which determine private borrowing costs and changes in wealth, affecting real economic activity (Rigobon and Sack, 2004). The direct link between monetary policy and financial markets comes from the fact that the latter are likely to quickly incorporate new information provided by the former. In particular, monetary policy effects could be reflected in stock prices, for they represent claims on future economic output, making them highly sensitive to economic conditions (Ioannidis and Kontonikas, 2006). However, monetary policy variations should influence stock values only in the medium term since, by definition, stocks are claims to real assets, which are independent of monetary policy in the very long run, provided that one assumes that monetary neutrality holds (Bernanke and Kuttner, 2005).

The discounted cash flow model considers that stock prices are equal to the present value of expected future net cash flows. Thus, there are three broad reasons why an unexpected monetary policy tightening could be linked to a decrease in stock prices: it may cause a decrease in expected future dividends, a rise in the future expected real interest rates used to discount those dividends, or an increase in the expected excess returns associated with holding stocks (Bernanke and Kuttner, 2005). On the contrary, an expansive monetary environment is associated with low interest rates and increases in economic activity, boosting stock prices (Ioannidis and Kontonikas, 2006).

2.3. Monetary policy and income distribution

Theories on functional income distribution and monetary policy mechanisms can be combined in diverse ways (for instance, Myatt (1986) derives a Phillips curve with an endogenous Kaleckian markup, and Barbosa-Filho (2014) develops a model for an inflation curve that contains a Kaleckian markup model of prices and income distribution). Hein (2007) and Hein and Schoder (2011) introduce monetary variables, as the interest rate, into a post Kaleckian distribution and growth model. Congruent with the balance sheet channel described by Bernanke and Gertler (1995), higher interest rates are expected to increase interest payments and reduce profits. Since the markup consist of two components, a part that covers profits and a part for interest payments, firms may (or may not) increase the markup as a consequence of higher interest costs. Assuming that the interest rate is an exogenous variable set by the central bank, which is passed onto the credit interest rate, in this setting the effect of monetary policy on functional income distribution depends on the elasticity of firms' markup with respect to interest rates. If the markup is inelastic, the distribution of income between wages and profits is not altered. Conversely, an interest-elastic markup implies that higher interest rates cause an increase in the markup, reallocating income from labor to capital, provided that nominal wages remain constant. Nevertheless, a permanent factor redistribution of income depends on the determinants of the markup, such as competition in the goods market and workers' relative power in the labor market (Hein, 2007).

Stockhammer's (2009) study is the closest to the perspective taken in this paper because his analytical framework is developed in a monetary setting, and it is general enough for testing different approaches regarding income distribution. He develops a non-accelerating inflation rate of unemployment (NAIRU) model arguing that it is consistent with the new Keynesian and post Keynesian approaches on income distribution. He shows that in a reduced-form setting the equilibrium wage and the equilibrium unemployment depend on the same set of variables (prices, capital stock, technology, bargaining strength of workers, and price setting power of firms), determining the existence of a unique wage share. Thus, the NAIRU model is a general medium run model that combines features of the different theories on functional income distribution, but does not detail the factors that determine the bargaining power of workers and the price setting power of firms (Stockhammer, 2009).

3. Previous empirical research

3.1. The determinants of functional income distribution

The empirical literature focused on the determinants of functional income distribution identifies that four broad, overlapping and self-reinforcing factors have influenced the evolution of factor shares: technology, international trade/globalization, bargaining power, and financialization. As mentioned earlier, the role of technology in explaining the trends of functional income distribution depends on the nature of technological change (Giovannoni, 2014b). In econometric analyses, technological change has been proxied by time trends, capital-labor ratios, and ICT capital (Stockhammer, 2009). On the other hand, classical international trade models imply that the effect of trade/globalization on functional income distribution depends on relative factor endowments. Indeed, Stolper and Samuelson's theorem suggests that the abundant factor will gain from international trade. Thus, capital should gain in industrialized countries. Through a different perspective, Rodrik (1998) argues that the more mobile factor is the one that gains from trade liberalization because its bargaining power increases. Consequently, greater openness to trade and capital mobility weakens labor's bargaining position and causes a decrease in the labor share. On empirical grounds, trade openness (exports plus imports relative to GDP) is the most common proxy for globalization (Stockhammer, 2009). The bargaining power of workers relative to firms could influence the distribution of income through its pressures to higher wages provided that labor demand is inelastic. In practice, bargaining power has been proxied with labor market institutions such as union density, employment protection legislation, and unemployment benefit generosity, among others; however, these variables do not capture the much broader concept of bargaining power appropriately (Stockhammer, 2009). Finally, financialization could affect income distribution through diverse channels. First, it changes the bargaining power of labor since firms gain investment and employment flexibility. Also, a shareholder-oriented corporate governance shifts firms' priorities toward profits. In a Kaleckian framework, financialization could lead to an increase of the markup, causing an increase in the capital share (Giovannoni, 2014b). There is no single measure of financialization since the concept is so broad; nevertheless, capital controls, capital mobility, and foreign direct investment have been used as proxies (Stockhammer, 2009).

There are several studies that have dealt in one way or another with the determinants of functional income distribution such as Harrison (2002), Guscina (2006), IMF (2007), European Commission (2007), Jayadev (2007), and Stockhammer (2009, 2013), among others.[2] IMF (2007) analyzes the determinants of functional income distribution by estimating a model with country fixed effects (FE) on a panel of 18 OECD economies over 1982-2002, in which the overall labor share and the income shares of labor in skilled and unskilled sectors are the dependent variables. The results suggest that labor globalization and technological progress have had a negative influence on the labor share, whereas labor market policies have had a positive but small impact. Likewise, European Commission (2007) estimates the sensibility of low, medium, and high skill workers income share as well as the aggregate labor share to several variables. It performs a country FE estimation based on a panel of 13 countries over 1983-2002. The main conclusion is that technological progress has been the most important variable for explaining the evolution of the labor share, and to a lesser extent the opening of the economy.

Stockhammer (2009) argues that IMF (2007) and European Commission (2007) estimations suffer from autocorrelation problems. Using a standard FE estimator and a first-differenced estimator, he replicates the above-mentioned studies to check if they are robust to different specifications. After finding that the impact of technological change is not reliable and robust to time fixed effects, he includes, among others, financialization variables. His main conclusion is that globalization and union density have negative and positive significant effects on the wage share, respectively. On the contrary, the results corresponding to financialization are not very robust. In another study, Stockhammer (2013) analyzes the determinants of the wage share for up to 71 advanced and developing countries for a maximum period of 1970-2007. He uses standard FE, first-differenced and dynamic GMM (Arellano-Bond) estimation methods for two different pools of countries:

[2] I only describe the closest to this paper in some detail.

one containing both developing and developed countries, and another including just advanced economies. In this case, Stockhammer (2013) finds strong negative effects of financialization, and also negative effects of globalization and welfare state retrenchment. Technological change, on the other hand, has influenced the wage share positively in developing countries and slightly negatively in advanced economies.

Although all elements described seem to play an important role in the determination of functional income distribution, there is no consensus on their relative importance. Giovannoni (2014b) concludes his empirical survey by stating that technology seems to have played a minor, for in the long run capital and labor are complements rather than substitutes. Globalization has had a depressing effect on the wage share, but financialization has been found to be the single most important factor influencing income distribution.

3.2. Monetary policy and functional income distribution

While much of the literature on monetary policy and inequality is focused on the distribution of income across individuals or households, one of the channels that affects personal income inequality imply a variation in the functional distribution of income. The income composition channel is based on the fact that households' primary income source is heterogeneous; some households rely more than others on labor income compared to financial income (Nakajima, 2015). To the extent that monetary policy affects wages and financial profits in different degrees, it influences both the personal and the functional distribution of income. Indeed, while analyzing the effects of monetary policy on personal income distribution in the U.S., Coibion et al. (2012) document that the income composition channel plays an important role in understanding the effects of monetary policy across households. In particular, they find that after shocks that tighten monetary policy aggregate labor earnings respond little whereas aggregate financial income rises sharply and business income declines.

Other studies have addressed functional income distribution explicitly. Some of them have suggested that monetary policy plays a role without performing an econometric analysis. Epstein and Power (2003) estimate the rentiers' income share (profits in the financial sector plus interest income of the non-financial sector and households) of 29 OECD countries over 1960-2000. They suggest that during the 1980s monetary policy contributed to curving inflation and increasing real interest rates, which are associated to the hike in the rentier share that came at expense of the labor share. Dumenil and Levy (2005), analyzing the effect of interest rates on non-financial sector profits in France and the U.S. over 1960-2001, suggest that the increase of the profit share since 1980 was driven by the rise in net real interest rate payments. Other studies, such as Jayadev (2007) and Stockhammer (2009), have applied econometric analyses including the real interest rate as an explanatory variable. In the context of capital account liberalization, Jayadev (2007) finds that real interest rates have statistically positive small effects on the labor share. However, this is not robust to the inclusion of other variables. In his study on the determinants of functional income distribution, Stockhammer (2009) uses the real interest rate as a proxy for domestic financialization. He finds small but not consistent negative impact of real interest rates on the wage share.

The studies of Argitis and Pitelis (2001), Hein and Schoder (2011), and Dünhaupt (2013), all based on a post Keynesian/Kaleckian perspective of income distribution, are closer to the approach taken in this paper. Argitis and Pitelis (2001) investigate the effects of monetary policy on changes in the income shares of industrial capital, financial capital, and labor in the nonfinancial corporate sector of the U.S. and the U.K. for the period 1965-1997. They find that the nominal lending interest rate affects negatively the industrial profit share using an autoregressive distributed lag model. Hein and Schoder (2011) analyze the effect of interest rate variations on the rates of capacity utilization, capital accumulation, and profit in the U.S. and Germany over 1960-2007. They use the ratio of net interest payments of non-financial business to the nominal net capital stock as a measure of the implicit long-term real interest rate and find that higher long-term real rates of interest increase the profit share. Finally, Dünhaupt (2013) studied the effect of financialization on the labor share using a panel of 13 OECD countries over the period 1986-2007. She finds that net interest payments of non-financial corporations as a share of the capital stock of the business sector are not significant for explaining the labor share when net dividend payments are also included as an explanatory variable. If dividend payments are excluded, interest payments show a significant negative effect on the labor share.

4. Data

In order to analyze the link between monetary policy and functional income distribution I use a panel of fourteen countries for the period 1875-2010. The countries considered are:

Argentina, Australia, Brazil, Canada, Denmark, Finland, France, Germany, Japan, Netherlands, New Zealand, Sweden, United Kingdom and United States. The data is based on national accounts (when available) and relies heavily on previous academic work of scholars.

As a measure of functional income distribution, I use the capital share of the total economy from the Bengtsson-Waldenström Capital Shares Database. The capital share is the ratio of the sum of capital incomes (interest, profits, dividends, and realized capital gains) to valued added. There are a number of measurement issues when estimating the capital share (for a detailed discussion see Bengtsson and Waldenström (2015)). The short-term interest rate, taken from Global Financial Data, is used as one of the proxies for monetary policy. Other variables used include the consumer price index, real gross domestic product, real and nominal wage, unemployment rate, stock indexes, trade openness, the current account of the balance-of-payments as a share of GDP, the share of industry in total value added, telephone lines per capita, the ratio of railway lines length to country area, and a commodity price index. The data appendix explains in detail the sources, definitions, and construction of the series. Table 1 shows the abbreviation, the description, and the unit of measure of the variables used in the econometric analysis presented in section 6.

Table 1. Abbreviation, description, and unit of measure of the variables

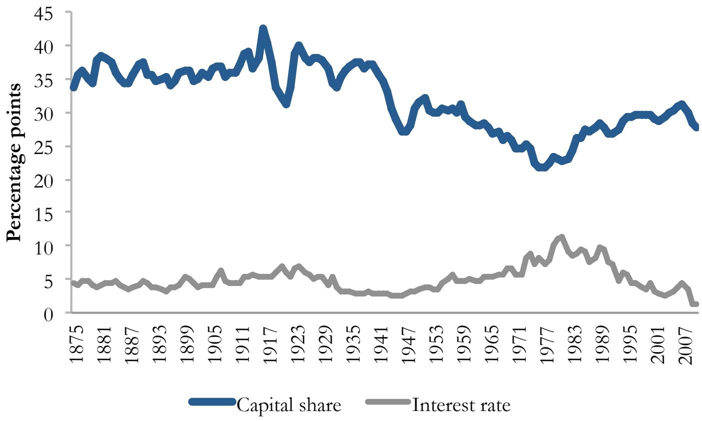
Abbreviation	Description	Unit of measure
k_share	Capital share	Percentage points
int	Short-term interest rate	Percentage points
r_int	Ex post short-term real interest rate	Percentage points
open	Trade openness	Percentage points
ca	Current account balance to GDP	Percentage points
ind_share	Industry share in value added	Percentage points
rail	Ratio of rail lines length to country area	Kilometers of rail lines per square kilometer of area
phone	Telephone lines per capita	Number of telephone lines per person
unemp	Rate of unemployment	Percentage points
nw_gr	Rate of variation of nominal wage	Percentage points
rw_gr	Rate of variation of real wage index	Percentage points
gdp_gr	Rate of variation of real GDP	Percentage points
gdp_gap	Output gap	Percentage points
gdp_pc	Rate of variation of real GDP per capita	Percentage points
stock	Rate of variation of stock price index	Percentage points
inf	Rate of inflation	Percentage points
com_inf	Rate of variation of the commodity price index	Percentage points
dev_tay	Deviation from the monetary policy rule estimated using Taylor's (1998) procedure	Percentage points
dev_rom	Deviation from the monetary policy rule estimated using Romer and Romer's (2002) procedure	Percentage points

4.1. Descriptive Statistics

Figure 1 shows the evolution of the average capital share and the average short-term interest rate over time. These trends should be interpreted with caution since they hide significant heterogeneity among countries. Regarding interest rates, the period between World War I (WWI) and World War II (WWII) is characterized by an inverse-U evolution that could be associated with the dynamics of the Great Depression. After WWII there is a steady increase of the short-term interest rates up to the early 1980s. Between the early 1980s and 2010 interest rates show a downward trend. With respect to the capital share, it appears to be either stable or slightly increasing up to WW I, when it starts to decline. Around the early 1980s the average capital share starts to increase.

Figure 1. Average capital share and average short-term interest rate, 1875-2010

Percentage points



Note: It corresponds to the mean of each variable for the countries with available data at each year, except Argentina and Brazil, which were excluded for being outliers.
Source: See data appendix

Table 2 presents the mean and standard deviation (SD) of the capital share and the interest rate in each country for every monetary period (as defined in section 5.2) in order to describe the evolution of the variables in a more systematic way. All countries' level of capital share is lower after WWI compared to the classical gold standard period. The capital share behaves quite heterogeneously during the interwar period, but it falls on average during the Bretton Woods era. The decrease experienced during the 1970s is quite homogeneous and significant, except in Argentina and Brazil where the capital share increased. The hike experienced between 1980 and 2010 is equally remarkable and general across countries. Now, the behavior of the short-term interest rates is more homogeneous, possibly reflecting the integration across countries and the framework determined by the international monetary systems. Indeed, the interest rate decreases steadily during the interwar period, after having increased with respect to the classical gold standard era. Throughout the Bretton Woods period and the 1970s, the short-term interest rate increased continuously, and it fell between the 1980s and 2010. Note that the interest rate volatility is the highest in the moderate monetary policy period under the current floating regime. This suggests that the higher the freedom of the exchange rate to float the higher the volatility of the short-term interest rates (Eichengreen 1989, Bordo 1993).

Table 2. Descriptive statistics of the capital share and short-term interest rates, 1875-2010
Percentage points

	Gold Standard 1875-1913		Interwar: General Float 1919-1925		Interwar: Gold Standard 1926-1931		Interwar: Managed float 1932-1939		Bretton Woods: Preconvertibility 1946-1958		Bretton Woods: Convertibility 1959-1971		Floating Regime: Agressive MP 1972-1979		Floating Regime: Moderate MP 1980-2010	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Capital Share																
Argentina			48,2	2,7	47,6	1,7	45,1	2,7	42,8	3,7	50,3	2,6	60,8	8,7		
Australia					43,8	0,6	47,1	0,7	45,2	3,4	22,7	6,5	18,5	1,8	22,0	1,4
Brazil									40,4	3,9	43,5	5,4	58,8	2,4		
Canada									30,5	1,2	21,0	2,9	20,6	1,1	25,3	2,0
Denmark	42,3	2,5	36,9	5,2	38,2	2,4	41,6	3,1	37,0	1,5	34,2	3,5	29,5	1,3	31,9	2,0
Finland	45,8	3,5	41,0	2,5	49,0	1,3	49,1	1,2	24,8	3,3	29,3	1,9	30,0	3,0	33,4	4,4
France	27,5	5,1	30,2	2,8	32,8	2,2	27,2	1,4	20,2	4,0	22,2	1,1	19,6	3,2	22,3	3,3
Germany	26,6	3,1			23,8	2,6	24,6	4,1	24,3	1,2	24,7	1,4	19,9	0,7	24,7	4,2
Japan			31,7	2,2	34,1	3,1	39,0	2,0	25,1	1,6	32,7	2,2	26,4	3,1	26,7	2,1
Netherlands			44,9	1,7	44,8	3,3	41,7	1,8	37,8	1,1	31,7	3,5	25,4	1,8	27,8	1,4
New Zealand					56,3	2,8	56,3	9,2	34,8	1,5	41,9	2,1			45,7	2,5
Sweden	36,8	2,2	34,2	3,4	32,4	2,0	31,7	2,7	29,6	2,0	26,4	1,3	25,4	3,1	32,5	3,2
United Kingdom	33,1	1,8	25,7	4,1	29,1	0,8	26,5	1,2	26,2	2,3	23,8	1,9	19,3	2,5	23,4	3,2
United States							20,9	3,1	24,4	1,7	24,4	1,9	21,4	0,7	24,0	1,9
Interest rate																
Argentina			6,7	0,3	6,6	0,4	3,9	0,5	3,9	0,9	6,0	0,0	18,0	0,0		
Australia					6,3	0,4	4,4	0,3	4,7	0,5	5,4	0,4	8,6	1,8	8,6	4,5
Brazil									6,4	0,8	13,5	6,2	25,0	7,3		
Canada									2,3	0,9	5,0	1,3	8,8	2,7	6,7	4,1
Denmark	4,6	1,0	6,0	0,8	4,9	0,8	3,7	1,0	4,3	1,0	6,7	1,2	8,9	1,4	5,4	2,9
Finland	4,9	0,6	8,5	1,0	6,9	0,8	4,4	0,9	6,1	1,2	7,1	0,4	8,6	0,8	5,7	2,7
France	3,2	0,6	5,6	0,7	3,8	1,5	2,8	1,0	3,3	0,9	4,7	1,6	9,8	1,7	6,3	3,7
Germany	3,7	0,7			5,6	1,1	4,0	0,0	3,8	0,8	3,4	0,9	3,7	1,1	3,6	1,8
Japan			7,9	0,3	5,8	0,6	3,6	0,4	6,0	1,2	6,2	0,8	6,2	2,1	2,2	2,3
Netherlands			4,2	0,4	3,8	0,8	2,5	0,5	3,0	0,8	4,5	0,9	6,3	1,9	4,8	2,1
New Zealand					6,8	0,3	3,7	1,4	3,4	2,6	6,8	0,4			9,4	5,3
Sweden	5,0	0,8	5,6	1,0	4,6	0,9	2,7	0,4	3,2	0,8	5,3	1,0	7,1	1,8	5,6	3,7
United Kingdom	4,1	1,2	4,9	1,3	4,7	1,0	2,0	0,0	3,4	1,6	6,0	1,4	11,9	3,1	7,4	4,0
United States							1,5	0,5	1,9	0,7	4,3	1,0	7,3	2,5	5,0	3,1

Source: See data appendix

5. Empirical Strategy

As suggested in section 2, there are especially two theoretical perspectives for analyzing the role of monetary policy on functional income distribution. On the one hand, in a Kaleckian framework that includes interest payments as overhead costs, an increase of interest payments reduces gross profits and firms may or may not react increasing the markup (Hein, 2015). If the markup turns elastic with respect to interest payments, a redistribution of income from workers to firms might take place (Hein and Schoder, 2011). If prices are not very flexible, firms could try to compensate the reduction of profits by cutting other production costs, such as labor costs. However, workers would react demanding higher nominal wages, and the socioeconomic and political conditions along with the distribution of power between firms and workers will determine the overall distribution of income (Argitis and Pitelis, 2001). Therefore, the effect of an increase in interest payments on the distribution of income is ambiguous.

On the other hand, the dynamics described by the new Keynesian Phillips curve and the reaction of stock prices to monetary shocks may also lead to functional income redistribution. Consider first that expansionary monetary policy is associated with stronger demand and increasing marginal costs that boost prices. Loosely speaking, increased wages and prices along with decreases in the unemployment rate are expected. While increased prices suggest a higher capital share, higher wages and lower unemployment imply a larger labor share. Therefore, the effect of an expansionary monetary policy depends on the size and the speed of the responses of wages and prices. The case of restrictive monetary policy is exactly the opposite, with the exception that the adjustment in the labor market is more likely to take the form of higher unemployment, assuming wages downward inflexibility. Again, the influence of monetary policy is ambiguous.

All in all, these two perspectives imply that the overall effect of monetary policy on functional income distribution cannot be inferred a priori, for it depends on the relative flexibility of prices, wages, and unemployment. Although we cannot expect a correlation of a certain sign, it is clear that an alteration of the income distribution is expected. Gwin and VanHoose (2012) have shown that profits react differently to inflation depending on the flexibility of prices and wages. Even if both wages and prices react to monetary shocks, the functional distribution of income may be affected temporarily. For instance, if there is a lag between the variations of wages and prices, any wage increase has to be financed out of profits, which will result in a lower capital share (Tarling and Wilkinson, 1985).

5.1. Measuring monetary policy

Note that the post Keynesian and the new Keynesian perspectives differ with respect to the monetary variable that triggers the alteration of income distribution. In the Kaleckian framework, interest payments constitute the important variable, whereas the monetary policy stance is the essential factor in the new Keynesian approach. It becomes clear that measuring monetary policy is essential for identifying each mechanism. Short-term interest rate movements could proxy firms' interest payments, assuming that the short-term interest rate set by monetary authorities is fully passed onto credit interest rates. The drawback of this strategy is that it does not consider that firms are likely to try to reduce their debt as a consequence of increased interest rates. Given that data on the aggregate debt level of firms in the long run is not available, one could argue that, in the very short run, firms cannot reduce their debt significantly, which makes the interest rate a reasonable proxy given the econometric approach explained in section 5.3. Nevertheless, using interest rates alone clearly misses a part of the picture. For this reason, I am not able to test explicitly the Kaleckian perspective.

Under certain conditions, short-term interest rates could signal the monetary policy stance; nonetheless, it is necessary to take into account that they are not exogenous. In fact, they vary endogenously with respect to nominal variables such as inflation and real variables such as real output and unemployment. Furthermore, judging monetary policy stance by nominal interest rates alone is misleading. As Friedman (1998) states, "initially, higher monetary growth would reduce short-term interest rates even further. As the economy revives, however, interest rates would start to rise". Then, high interest rates could signal that monetary policy has been easy, while low interest rates reflect that the monetary policy stance has been tight. The ability of interest rates to identify the stance of monetary policy depends on the level of the natural rate of interest, which is the rate of return required to keep actual output equal to potential output (Justiniano and Primiceri, 2010). Only if the actual interest rate is below the natural rate of return on capital, monetary policy would be easy and prices might increase. The converse occurs when the actual interest rate is above the natural rate. Using the gap between actual and the natural interest rate as an indicator of the monetary policy stance is tempting. Nevertheless, the natural rate is neither observable nor constant because it is correlated with the underlying production capacity of the economy. Indeed, empirical models use productivity growth, the capital share, the rate of depreciation of capital, and shocks as the variables that explain the natural interest rate (Anderson, 2005). Furthermore, the nominal interest rate cannot always track the natural rate, for the latter might sometimes be negative (Justiniano and Primiceri, 2010). All this suggests that estimating a natural interest rate would not be convenient in this setting. Therefore, I use an alternative indicator of the monetary policy stance in order to capture the new Keneysian dynamics that influence income distribution.

A common way of disentangling the endogenous component of interest rate variations is using a monetary policy rule that states how monetary authorities should respond to economic conditions. Assuming a linear functional form, the monetary policy rule proposed by Taylor (1993) describes how the federal funds rate should be adjusted by specific numerical amounts in response to changes in inflation and real GDP:

$$r = \pi + gy + h(\pi - \pi^{*}) + r^{f}$$

Where r is the short-term interest rate, π is the inflation rate, y is the percentage deviation of real output from trend, g and h are constants, π^{*} is the central bank's inflation target, and $r^{f}$is the central bank's estimate of the equilibrium real interest rate. This monetary policy rule suggests cutting the interest rate in response to lower inflation or declines in production and rising the interest rate when inflation or production is too high. The gap between the actual interest rate and the one suggested by the policy rule is the measure of the monetary policy deviation.[3]

Estimating the monetary policy rule raises some issues such as determining the equilibrium real interest rate and the presence of serial correlation in the errors. Taylor (1998) regresses short-term interest rates on inflation and the percentage deviation of real output from a trend. In this regression, the slope coefficient of inflation is $(1 + h)$ and the intercept is $(r^{f} - h\pi^{*})$. Take into account that if the estimate of the slope of inflation is less than one,

[3] Taylor (1998) argues that this functional form follows accurately actual U.S. policy actions in recent years, but it can also be used to describe monetary policy in different historical time periods in which the parameters are expected to differ depending on how the monetary policy is run. He analyzes whether the parameters in the monetary policy rule vary in the classical gold standard, the fixed exchange rate Bretton Woods era, and the flexible exchange rate era. Taylor (1998) finds that the interest rate response to output and inflation has increased over time.

an increase in inflation would be associated with a real interest rate cut, which would lead to increasing inflation. On the other hand, if the estimate is greater than one, real interest rates would increase in response to higher inflation, stabilizing it. This empirical strategy assumes that the equilibrium real interest rate is constant over time and does not correct for serial correlation in the errors.

On the other hand, Romer and Romer (2002) use an approach that takes these two aspects into consideration. First, because inflation has varied significantly over time, they estimate an ex ante real interest rate. They regress the ex post real rate on a constant, a trend, and four lags of each of the nominal interest rate, the deviation of log output from trend, and inflation. The fitted values of this regression are the estimates of the ex ante interest rates. Romer and Romer (2002) argue that ex ante real interest rates trends presumably reflect movements in the equilibrium real rate. Thus, they estimate the equilibrium real interest rate by using a linear interpolation between two years in which actual output was close to its trend and real interest rate was stable. The monetary policy rule is estimated using the deviations of the ex ante real interest rate from this trend. Second, they take into account that central banks tend to adjust interest rates gradually by including a lagged dependent variable as an explanatory variable, which also helps to correct for serial correlation in the errors. In particular, they estimate:

$$r_t^{DT} = \alpha + \beta\pi_t + \gamma(Y_t - \bar{Y}_t) + \delta r_{t-1}^{DT}$$

Where r^{DT} is the detrended ex ante real interest rate, π is the inflation rate, Y is actual output, $\bar{Y}$ is potential output, and α reflects the target of inflation. With a lagged dependent variable, the implied long-run response of the real interest rate to inflation and output are given by $\beta/(1-\delta)$ and $\gamma/(1-\delta)$, respectively. The monetary policy rule deviation is the difference between actual interest rate and the predictions (long-run responses) of this regression.

I follow both Taylor's (1998) and Romer and Romer's (2002) procedure for estimating two series of the monetary policy rule for each country with data for the period 1980-2010. Romer and Romer's (2002) procedure requires detrending real interest rates. In general, ex ante real interest rates show a downward sloping trend before WWII and an upward sloping one in the postwar period. The years selected for removing these trends and the results of the regressions used for estimating both monetary policy rules are shown in Tables A1, A2, and A3 in the appendix. Once both policy rules are estimated, I compare their implications with actual policies. The difference between the actual interest rate (nominal short-term interest rate in Taylor's (1998) procedure and ex ante real interest rate in Romer and Romer's (2002) procedure) and the interest rate suggested by the monetary policy rule is supposed to isolate the endogenous movements in the interest rate and shows the monetary policy stance. A positive (negative) deviation reflects tight (loose) monetary policy.

5.2. Defining monetary periods

As explained formally in section 5.3, the empirical strategy used to identify the link between monetary policy and functional income distribution is based on panel regressions. In order to mitigate the omitted-variable problem and capture potential non-linearities in the data, it is convenient to split the time span into shorter periods in which the monetary framework is held relatively constant. Although defining such sub-periods is fairly arbitrary given that not all countries in the panel adopt and give up the same framework at the same time, I define monetary periods based on the prevailing international monetary system and the monetary policy framework.

The classical gold standard was the international monetary system in place approximately between 1870 and 1913. The main characteristic of the gold-standard regime is that it provides a constraint on the level and variation of the money supply since it is directly influenced by the amount of gold in the economy. From an international perspective, the gold standard implies a system with free international capital flows and a fixed exchange-rate regime in which balance-of-payments surpluses (deficits) are offset with gold imports (exports). This period was characterized by the authorities' commitment to an anti-inflation, balanced-budget, stable-money policy. Indeed, the main objective of the monetary authorities was to maintain the gold parity, and sterilization was used for balance-of-payments purposes rather than to fight unemployment. Prices and wages were more flexible than ever (Officer, 2008).

WWI disrupted completely the classical gold standard. When WWI was over, a generalized floating regime was adopted and maintained until mid 1920s. During this period governments generally did not intervene directly in the foreign exchange market. However, they adjusted policies in response to exchange market trends. For instance, stabilization was the main objective whenever inflation was out of control (Eichengreen, 1989). By mid 1920s many countries gradually returned to the gold standard, but this time the system was different than the previous. The new system was based on the use of exchange reserves. Indeed, most countries' central banks would exchange their currencies into other currencies convertible into gold, rather than into gold itself (Officer, 2008). Wages and prices were less flexible than before, and monetary policy was leaded more by internal purposes rather than for preserving the exchange rate. In this context, sterilization of gold flows was very common (Officer, 2008). The end of the interwar gold standard occurred mainly between 1929 and 1931 –although some countries like France remained under the system until 1936- because monetary expansion was needed to fight the Great Depression. By 1936, most countries have abandoned the gold standard (Eichengreen and Irwin, 2009), and the world entered a period of managed float exchange rates with pervasive capital controls until the beginning of WWII (Eichengreen, 1989).

The international monetary system took a new shape after WWII. The Bretton Woods system was designed as an adjustable peg system combining the strengths of the gold standard and flexible exchange rates for providing stable exchange rates, and allowing national full employment policies (Bordo, 1993). The Bretton Woods era can be split into two sub-periods. During the preconvertibility period (1946-1958), most countries used exchange controls and controls on trade. During these years the system's functioning was closer to the adjustable peg system originally designed (Bordo, 1993). The convertible Bretton Woods period (1959-1971) shifted from an adjustable peg system towards a de facto fixed exchange rate regime. Capital controls permitted governments to use monetary policy for purposes different than the stabilization of the balance of payments (Eichengreen, 1998). In fact, authorities were more concerned about the unemployment consequences of wage rigidity (Bordo, 1993). The system collapsed in 1971 when the U.S. decided to suspend the convertibility of the dollar into gold.

In 1973, because of the increased capital mobility, exchange rates were allowed to float. This floating exchange rate regime, although seen as a temporary measure at the time, is still working today (Obstfeld and Taylor, 2003). Central banks intervene form time to time to manage the evolution of the value of their currency in order to avoid destabilizing effects of capital flows. In this sense, the system could be better described as a managed system of floating exchange rates (Matziorinis, 2006). Without dealing with the need of keeping a fixed exchange rate, countries have opened their capital markets and used monetary policy to pursue domestic objectives. The monetary framework has also changed within this period. In particular, the monetary approach of the 1970s had an expansionary bias that ended by the 1980s. In order to split the floating exchange rate regime period, I take the evolution of the U.S. monetary policy as an indicator of the development of monetary policy in the rest of countries in the panel, for similar changes in stabilization policy occurred in most industrialized countries (Romer and Romer, 2002; Bernanke, 2004; Summers, 2005).

Romer and Romer (2002) show that changes in policy, particularly monetary policy, in the postwar period in the U.S. are associated with changes in policy markers' understanding of the functioning of the economy and the effects of policy. During the 1960s and 1970s monetary policy was used aggressively to stimulate and support economic growth and reduce unemployment; nevertheless, inflation became a serious problem. This is explained by the monetary authorities' beliefs regarding the existence of a permanent trade-off between inflation and unemployment and the feasibility of delivering very low unemployment permanently during the 1960s. In the 1970s policy makers internalized the natural rate of unemployment hypothesis; however, their estimate of the natural rate was so low that they believed they had more room for expansionary policy. In addition, they thought that monetary policy was not an effective tool to curb inflation, which led them to use nonmonetary policies such as wage and price controls and income policies. Only by 1979, the authorities adopted the current view of the inexistence of a long-run tradeoff between inflation and unemployment, and coupled it with a realistic estimate of the natural rate. Therefore, from the 1980s policy became more moderate and returned to have the objective of low inflation.

Summing up, the monetary periods I define based on the international monetary system and/or the monetary policy framework are:

- Classical gold-standard (1875-1913)
- Interwar period (1919-1939)[4]

[4] Splitting the interwar period is somehow more arbitrary. For example, Eichengreen (1989) defines the general floating regime between 1922 and 1926, the fixed rates regime between 1927 and 1931, and the

  - General floating (1919-1925)
  - Gold-exchange standard (1926-1931)
  - Managed float (1932-1939)
- Bretton Woods (1946-1971)
  - Preconvertibility (1946-1958)
  - Convertibility (1959-1971)
- Floating exchange rate (1972-2010)
  - Aggressive monetary policy (1972-1979)
  - Moderate monetary policy (1980-2010)

5.3. Econometric approach

Given that I use data for the period 1875-2010, performing a single panel estimation covering such a long time span is likely to produce biased estimates because there are a number of unobservable characteristics impossible to capture given the available data. One of such characteristics -extremely important in this context- is the framework in which monetary policy is conducted, which has significantly changed over time. This is the reason for splitting the period of analysis into the monetary periods defined in section 5.2. Because the sample of countries is limited and the definition of monetary periods makes the time span too short for an individual time-series analysis, the econometric approach relies on panel regressions. In addition of being the most common econometric approach in studies on functional income distribution, running panel regressions is a better strategy than, for example, performing a vector autoregression model (VAR) for individual countries or a panel VAR. Such analyses imply a constant linear relationship at each point in time and, more importantly, are likely to suffer from omitted-variable bias. In fact, in a VAR analysis, the framework in which monetary policy is run would end up in the error term and, since it is expected to be correlated with our monetary policy indicators, it would become part of the estimated historical "shock" used to estimate an impulse response (Stock and Watson, 2001). The advantage of panel estimations is that they can take all unobservable time-invariant factors into account, allowing one to control for country specific effects (Wooldrige, 2002). In addition, because I have split the sample into monetary periods I can

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managed float from 1932 to 1936. On the other hand, Bordo (1993) divides the period in the following way: general floating from 1919 to 1925, gold-exchange standard between 1926 and 1931, and managed float until 1939. I follow Bordo's (1993) time periods.

attach specific estimates for each sub-sample, capturing potential non-linearities in the data. However, panel regressions also bring about an important disadvantage. It implies that the marginal effect of a change in a variable is the same across countries, which is a strong assumption. Therefore, the coefficients have to be interpreted with caution since they show average effects across a group of countries and they only represent an approximation to the true relationship.

Having said that, it is important to mention that the time range in which the data is available varies significantly across countries. Therefore, not all countries are considered for each panel regression, which makes the estimates not strictly comparable between them. Moreover, the data series of most countries contain gaps, determining that all panels are unbalanced. Table 3 describes the characteristics of the panels used for each monetary period.

Table 3. Description of the panels

Monetary period		Years	T	N	Countries
Gold standard		1875-1913	39	6	DEN, FIN, FRA, GER, SWE, UK
Interwar	General float	1919-1925	7	8	ARG, DEN, FIN, FRA, JAP, NED, SWE, UK
	Gold standard	1926-1931	6	11	ARG, AUS, DEN, FIN, FRA, GER, JAP, NED, NZL, SWE, UK
	Managed float	1932-1939	8	13	ARG, AUS, DEN, FIN, FRA, GER, JAP, NED, NZL, SWE, UK, US
Bretton Woods	Preconvertibility	1946-1958	13	14	ARG, AUS, BRA, CAN, DEN, FIN, FRA, GER, JAP, NED, NZL, SWE, UK, US
	Convertibility	1959-1971	13	13	AUS, BRA, CAN, DEN, FIN, FRA, GER, JAP, NED, NZL, SWE, UK, US
Floating regime	Agressive MP	1972-1979	8	13	ARG, AUS, BRA, CAN, DEN, FIN, FRA, GER, JAP, NED, SWE, UK, US
	Moderate MP	1980-2010	31	12	AUS, CAN, DEN, FIN, FRA, GER, JAP, NED, NZL, SWE, UK, US

Note: T= number of years, N= number of countries, MP= monetary policy, ARG= Argentina, AUS=Australia, BRA=Brazil, CAN=Canada, DEN=Denmark, FIN=Finland, FRA=France, GER=Germany, JAP=Japan, NED=Netherlands, NZL=New Zealand, SWE=Sweden, UK=United Kingdom, US=United States

Knowing the features of the data is crucial for selecting the appropriate econometric approach. Standard tests run using the moderate monetary policy sample confirm that the data is characterized by non-stationarity and heteroskedasticity, serial correlation, and cross-section dependence in the error terms.[5] [6] In order to avoid the problem of spurious

[5] Using panel unit root tests I investigated whether or not *k_share* is stationary. In particular, I used the Pesaran's unit root test based on the simple averages of the individual sectionally augmented Dickey-Fuller

regressions that unit roots imply, I use data in first differences, which determines that I am able to identify short-term effects only.[7] To account for heteroskedasticity and autocorrelation in the error terms I estimate the basic specification using GLS allowing for country specific AR(1) process and heteroskedasticity in the error terms, which is a natural route if there is serial dependence (Wooldridge, 2002).[8] Coping with cross-section dependence in a GLS framework requires balanced panels, which is not our case. Nevertheless, as shown in section 6.3, not accounting for cross-section dependence does not seem to result in misleading conclusions.

The basic specification is the following panel regression:

$$kshare_{it} = \beta mp_{it} + \delta X'_{it} + v_{it}$$

Where $kshare$ is the first difference of the capital share, mp is the first difference of the monetary policy indicator (short-term interest rate or deviations from the monetary policy rule), and X is vector containing the first difference of other controls. Countries are represented by i, time by t, and v_{it} is the error term. β are parameters to be estimated and δ is a vector of parameters corresponding to the additional controls.

Following the literature on the determinants of functional income distribution, the controls are trade openness as a proxy of globalization, the current account balance as a share of GDP to proxy financialization since it could be interpreted as net inflows of capital (Higgins and Klitgaard, 1998), and indicators of technological change. In all samples the rate of variation of real GDP per capita is used as a measure of technological change. In addition, I add other variables that could potentially capture this concept. In particular, the

statistics, along with demeaned Im-Pesaran-Shin test and demeaned Fisher-type tests using augmented Dickey-Fuller and Phillips-Perron tests in each panel. All tests were run with and without a time trend, and 3 lags. The results are not conclusive but the great majority suggests that *k_share* is non-stationary.

[6] For investigating heteroskedasticity, autocorrelation, and cross-section dependence in the error terms, I estimated the basic specification with standard fixed effects and tested the residuals. For cross-section dependence, I used the Pesaran CD test where the null hypothesis of cross-section independence was rejected at the 5% level. Heteroskedasticity was tested using the modified Wald statistic; the null hypothesis of homoskedasticity was rejected at the 1% level. Finally, serial correlation was investigated with a preliminary analysis based on Wooldridge (2002). In particular, the test is a pooled OLS regression of the residuals of the basic specification on its lagged values using robust standard errors. Since the coefficient of the lagged residuals is 0.2 (very different from the -0.5 implied by the fixed effects assumption of serially uncorrelated errors) and the t statistic is 3.49, there is evidence of positive serial correlation.

[7] From now on, when a variable is mentioned I refer to the first difference of that variable.

[8] This estimation method has been used in studies in similar settings such as in Roine et al (2009) in the context of the long-run determinants of personal income distribution.

ratio of railways route lengths of line to the country area is used for the classical gold standard and the interwar periods. For the Bretton Woods era I use telephone lines per capita, and the share of industry in total value added is used for the period 1972-2010. The share of industry in total value added is my preferred variable because it reflects not only technological change but also structural change.[9] Nevertheless, I could not use this variable in all monetary periods because of data availability. There are two important factors missing in this specification that theoretically play an important role in the determination of factor shares. They are the bargaining power of labor and firms and the price setting power of firms. Even today there is not a precise indicator that could capture the effect of these factors, and certainly not in the long run.[10] Consequently, the interpretation of the estimates must be done with caution.

I use a two-step approach in order to assess the channels that explain the potential link between monetary policy and functional income distribution. First, I replace the monetary policy indicators with variables that reflect such channels in the basic specification. In particular, the variables used are the first difference of the rate of variation of stock prices as a proxy for assets prices, the rate of variation of nominal wages, inflation, and the rate of unemployment. I expect stock prices and the rate of unemployment to be positively associated with the capital share, while the contrary is expected in the case of nominal wages. Inflation could take both signs because it reflects the increase of both wages and prices. However, when the capital share is already controlled for wages and unemployment, inflation should take a positive sign, for it would capture the rise in profits.

Second, I regress each channel indicator on the monetary policy variables and controls to formally test the argument that those variables are the mechanisms behind the link between

[9] The correlation coefficient of the industry share and the railways indicator for the countries in which both variables are available suggest that they follow the same cycles in most countries. Indeed the coefficient of correlation is 0.78 for Argentina, 0.95 for Finland, 0.86 for Japan, and 0.92 for Sweden. On the other hand, in France and the U.S. both indicators do not move together, for the coefficients of correlation are 0.0 and -0.41, respectively. On the other hand, although telephone lines per capita is a variable associated to the role of technology, it is arguably not a good measure of structural change. The coefficient of correlation between telephone lines per capita and the industry share in value added is 0.80 in Argentina, 0.60 in Brazil, 0.43 in Finland, 0.92 in New Zealand, -0.59 in Sweden, and 0.73 in the U.S.

[10] Some studies, such as Stockhammer (2013), have proxied the bargaining power of workers with government expenditure based on the rationale that the bargaining power of workers increases with the welfare state generosity. However, government expenditure cannot be included in this setting because it is endogenous with respect to the capital share because it contains the wage share of public employees and unemployment benefits, which are constituent parts of the labor share.

monetary policy and factor shares. In particular, I estimate the following equation for each channel:

$$channel_{it} = \beta mp_{it} + \delta X'_{it} + v_{it}$$

Where $channel$ refers to stock prices, wages, inflation, and unemployment. The Kaleckian perspective implies a positive relationship between the movements in the interest rate and prices (proxied by inflation and stock prices), a negative relationship between interest rates and wages and a positive correlation of interest rates and unemployment. On the other hand, the new Keynesian perspective assumes that expansionary monetary policy (proxied by negative deviations from the monetary policy rule) causes a positive effect on prices and wages, and a negative effect on unemployment. For explaining stock prices, the set of controls include the rate of variation of real GDP to take into account the fact that the stock market is procyclical and inflation since stock prices adjust positively to the price level. On the other hand, the Phillips curve is the basis of standard estimations of the link between monetary policy and labor market variables. Therefore, the equations that explain wages, inflation, and unemployment are based on that theoretical framework. The rate of variation of the nominal wage is regressed on the unemployment rate to proxy for labor market conditions, lagged inflation and the lagged rate of variation of the commodity price index to account for the effect of prices, and the contemporaneous output gap to measure demand pressures on wages (Perry, 1975). The variations of unemployment are regressed on the output gap to reflect aggregate demand fluctuations, lagged inflation, real wages, and the rate of variation of GDP per capita as a proxy for productivity (Hinaunye and Ashipala, 2010). Finally, changes in inflation are explained by the contemporaneous output gap in order to capture the conditions of domestic aggregate demand and the rate of variation of the commodity price index to account for supply shocks.

A word of caution is necessary. The results of the regressions that test the transmission channels should also be interpreted as mere approximations to the true effect of monetary policy because a number of relevant factors are not considered. For instance, labor market policies and institutions such as taxes on labor, unemployment benefits, employment protection legislation, bargaining power, minimum wages, etc. are ignored (Bassanini and Duval, 2006). However, given that the link between monetary policy and the transmission channels has been well documented in other studies, a reduced set of controls suffice for showing the validity of these channels.

6. Results

6.1. Benchmark: evidence from the moderate monetary policy period

I use the 1980-2010 period as a benchmark to identify the specifications that better capture the potential link between monetary policy, functional income distribution, and the transmission channels. Table 4 shows the results of different specifications estimated with the first differenced GLS method allowing for individual AR(1) processes and heteroskedasticity in the errors.

Columns 1-4 use the interest rate as the indicator of monetary policy, while columns 5-8 use the deviations from the monetary policy rule estimated using Taylor's (1998) procedure (henceforth, monetary policy deviations) as the proxy for monetary policy. Both the interest rate and monetary policy deviations are included as regressors in columns 9-12. The first specification in each set (columns 1, 5, and 9) is the simplest since it only includes the monetary policy indicator as the explanatory variable in addition to other controls. The second specification in each set (columns 2, 6, and 10) allows for different effects depending on the direction of the variation of the monetary policy indicator. I do this by including the following dummy variables: *d1* takes the value of 1 when the interest rate in period *t* is lower than the interest rate in period *t-1* and 0 otherwise; *d2* takes the value of 1 when the deviation from the monetary policy rule in period *t* is lower than its value in period *t-1* and 0 otherwise; *d3* is the interaction between *d1* and *d2*. The third specification in each set (columns 3, 7, and 11) allows for a lagged effect of monetary policy on functional income distribution by introducing two lags of the monetary policy indicator as explanatory variables. The final specification in each set (columns 4, 8, and 12) allows for lagged effects of monetary policy controlled for the direction of such changes.

Table 4. Correlation between monetary policy indicators and capital share, 1980-2010

	Interest rate				Deviations from the monetary policy rule				Interest rate and deviations from the rule			
	1	2	3	4	5	6	7	8	9	10	11	12
int	0.5101	0.0929**	0.0249	0.0365					0.0393	0.0476	0.0043	0.0115
	(0.322)	(0.0392)	(0.0339)	(0.0432)					(0.0384)	(0.0395)	(0.0409)	(0.0428)
lag1.int			-0.0686**	-0.0741*							-0.0656*	-0.0511
			(0.0306)	(0.0390)							(0.0361)	(0.0382)
lag2.int			-0.1330***	-0.1059***							-0.1352***	-0.1232***
			(0.0294)	(0.0373)							(0.0297)	(0.0322)
dev_tay					0.0411	0.0586**	0.0382	0.0255	0.0228	0.0273	0.0521	0.0512
					(0.0283)	(0.0297)	(0.0327)	(0.0418)	(0.0337)	(0.0346)	(0.0385)	(0.0420)
lag1.dev_tay							-0.0111	0.0274			-0.0117	0.0081
							(0.0345)	(0.0422)			(0.0433)	(0.0466)
lag2.dev_tay							-0.0460	-0.0251			0.0185	0.0190
							(0.0321)	(0.0326)			(0.0411)	(0.0440)
open	0.0475***	0.0451***	0.0371**	0.0358**	0.0507***	0.0468***	0.0443***	0.0330**	0.0481***	0.0467***	0.0349**	0.0309*
	(0.016)	(0.0161)	(0.0163)	(0.0169)	(0.0158)	(0.0159)	(0.0163)	(0.0165)	(0.0159)	(0.0161)	(0.0164)	(0.0169)
ca	0.3228***	0.3156***	0.3521***	0.3457***	0.3182***	0.3146***	0.3303***	0.3239***	0.3236***	0.3235***	0.3432***	0.3375***
	(0.041)	(0.0414)	(0.0431)	(0.0435)	(0.0408)	(0.0408)	(0.0438)	(0.0441)	(0.0411)	(0.0413)	(0.0430)	(0.0441)
ind_share	0.2854***	0.3312***	0.2773***	0.3085***	0.3177***	0.3407***	0.3163***	0.3731***	0.2898***	0.2902***	0.3129***	0.3374***
	(0.072)	(0.0757)	(0.0767)	(0.0795)	(0.0685)	(0.0688)	(0.0727)	(0.0728)	(0.0723)	(0.0732)	(0.0776)	(0.0797)
gdp_pc	0.1889***	0.1801***	0.1644***	0.1610***	0.1843***	0.1807***	0.1849***	0.1817***	0.1877***	0.1892***	0.1627***	0.1605***
	(0.024)	(0.0242)	(0.0262)	(0.0261)	(0.0239)	(0.0239)	(0.0253)	(0.0250)	(0.0239)	(0.0241)	(0.0262)	(0.0264)
d1		0.2089*		0.0776								
		(0.1116)		(0.1284)								
lag1.d1				-0.0901								
				(0.1225)								
lag2.d1				0.1484								
				(0.1226)								
d2						0.1591*		-0.0334				
						(0.0859)		(0.1432)				
lag1.d2								0.0274				
								(0.0422)				
lag2.d2								-0.0251				
								(0.0326)				
d3										0.1233		-0.0072
										(0.1220)		(0.1374)
lag1.d3												0.1881
												(0.1325)
lag2.d3												0.0582
												(0.1334)
Obs	344	344	320	320	344	344	320	320	344	344	320	320
Countries	12	12	12	12	12	12	12	12	12	12	12	12

Notes: First differenced GLS estimations allowing individual specific AR(1) process and heteroskedasticity in the error terms. Robust standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* and *lag2.x* refer to the first and second lag of variable x, respectively. All variables are first differences except for dummies. Dependent variable is *k_share*.

Before considering the coefficients of the monetary policy indicators, it is worth noting that the controls (*open*, *ca*, *ind_share*, and *gdp_pc*) are consistently significant in explaining capital share changes. Indeed, the great majority of the times the coefficients are significant at the 1% level. On average, an increase of 1 percentage point in trade openness is associated with an increase of 0.04 percentage points in the capital share. The effect of a similar increase in the current account is associated with a 0.33 percentage points increase in the capital share, whereas the increases associated with the industry share and GDP per capita are 0.31 and 0.18 percentage points, respectively.[11] This suggests that trade globalization, financialization, and structural and technological change have significantly contributed to the increase of the capital share over the last three decades.

Now, regarding the monetary policy indicators, table 4 shows clearly that, when entered alone, the contemporaneous values in monetary policy indicators do not explain the capital share in a statistically significant manner; however, they tend to move in the same direction. On the other hand, specifications 2 and 6 suggest that, when controlled for the direction of the change, contemporaneous monetary policy variations can positively affect the movements in the capital share at a 10% level of statistical significance. The effect is greater in the case of declining interest rates. In particular, when the interest rate is used as the proxy for monetary policy, a 1-percentage point increase in the interest rate is associated with an increase of 0.09 percentage points in the capital share, whereas a 1-percentage point reduction of the interest rate is associated with an increase of 0.12 percentage points in the capital share.[12] When the monetary policy deviations are used as the proxy for monetary policy, a monetary tightening of 1 percentage point is associated with an increase of 0.06 percentage points in the capital share. On the other hand, a 1-percentage point monetary ease is associated with an increase of 0.10 percentage points in the capital share.[13]

The link between monetary policy and functional income distribution is statistically more significant when interest rate movements are used as proxy and monetary policy is allowed to influence the capital share over time. Indeed, specifications 3 and 4 show that the first

[11] The reported average effects correspond to the mean of the coefficients of the 12 specifications shown in table 4.

[12] The Wald test of joint significance of *int* and *d1* in specification 2 rejects the null of zero effect at the 5% level.

[13] The Wald test of joint significance of int and *d1* in specification 6 rejects the null of zero effect at the 10% level.

and second lags of the interest rate have a significant negative correlation with the capital share. Also note that the coefficient of the contemporaneous change of the interest rate is no longer significant, suggesting that the positive association found in specifications 2 and 6 was misleading. Based on the point estimate, a 1-percentage point increase in the interest rate is associated with a decrease of 0.07 percentage points in the capital share the next period and 0.13 percentage points two periods ahead.[14] Therefore, restrictive monetary policy today is associated with a decrease in the capital share in the future, while the contrary occurs with expansionary monetary policy. It is remarkable that the lagged effects of the interest rate remain significant whether the direction dummies and the monetary policy deviations are included or not.

In order to assess the potential channels through which monetary policy influences functional income distribution, table 5 presents the first differenced GLS estimations of the correlation between changes in each channel indicator and capital share movements. The coefficients of both stock prices and nominal wage show the expected signs and are statistically significant. Indeed, a 1-percentage point increase in stock prices is associated with an increase of 0.005 percentage points in the capital share, while a similar increase in the nominal wage is correlated with a 0.05 percentage points reduction in the capital share. The results regarding unemployment and inflation suggest a lagged effect on the capital share.[15] A contemporaneous increase of 1 percentage point in unemployment is associated with a 0.13 increase in the capital share one period ahead. Likewise, a 1-percentage point increase in inflation is associated with a 0.10 percent point decrease in the capital share one period ahead. When all contemporaneous and lagged channel indicators are included as explanatory variables, the results remain similar with exception of the coefficients of unemployment and inflation, which are no longer statistically significant.

[14] The Wald test of joint significance of *lag1.int* and *lag2.int* in specification 3 rejects the null of zero effect at the 1% level.

[15] I added the contemporaneous and lagged output gap in the regressions that included unemployment as an explanatory variable in order to prevent unemployment from reflecting economic activity.

Table 5. Correlation between channel indicators and capital share, 1980-2010

	1	2	3	4	5	6
stock	0.0047***				0.0054***	0.0046***
	(0.0013)				(0.0013)	(0.0015)
lag1.stock						-0.0001
						(0.0016)
nw_gr		-0.0545**			-0.0400*	-0.0443*
		(0.0220)			(0.0220)	(0.0264)
lag1.nw_gr						-0.0696**
						(0.0292)
unemp			-0.0924		-0.0037	-0.0720
			(0.0646)		(0.0671)	(0.0678)
lag1.unemp			0.1284**			0.0927
			(0.0609)			(0.0642)
inf				-0.0318	0.0006	-0.0049
				(0.0331)	(0.0331)	(0.0357)
lag1.inf				-0.0994***		-0.0340
				(0.0319)		(0.0341)
open	0.0629***	0.0484***	0.0555***	0.0483***	0.0626***	0.0607***
	(0.0162)	(0.0160)	(0.0156)	(0.0162)	(0.0164)	(0.0162)
ca	0.3062***	0.3161***	0.2993***	0.3010***	0.3206***	0.2851***
	(0.0389)	(0.0414)	(0.0417)	(0.0412)	(0.0404)	(0.0414)
ind_share	0.3290***	0.3650***	0.3105**	0.3708***	0.2611***	0.3408***
	(0.0676)	(0.0720)	(0.0705)	(0.0739)	(0.0764)	(0.0753)
gdp_pc	0.1925***	0.1915***	0.0362	0.1714***	0.1690***	0.0380
	(0.0230)	(0.0239)	(0.0295)	(0.0245)	(0.0245)	(0.0322)
gdp_gap			1.454***		0.9902***	1.7047***
			(0.3572)		(0.3357)	(0.3585)
lag1.gdp_gap			-1.3580***			-1.0115***
			(0.3331)			(0.3507)
Obs	347	336	336	336	336	325
Countries	12	12	12	12	12	12

Notes: First differenced GLS estimations allowing individual specific AR(1) process and heteroskedasticity in the error terms. Robust standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* refers to the first lag of variable x. All variables are first differences. Dependent variable is *k_share*.

The previous analysis suggests that asset prices and wages have determined the evolution of factor shares over the last three decades. In order to complete the argument it is necessary to show that the monetary policy indicators influence the channels indicators. Table 6 shows regressions of each channel indicator on the monetary policy indicators and the controls described in section 5.3. The left panel uses contemporaneous and lagged values of the interest rate as proxies for monetary policy, whereas the right panel uses the monetary policy deviations instead. Monetary policy indeed influences the channel indicators in a statistically significant manner. Note that the coefficients of the contemporaneous values of the interest rate and the monetary policy deviations have opposite signs when explaining the nominal wage and inflation. This could be signaling reverse causality between interest rates and the channel indicators. For instance, considering the role of inflation premium, interest rates are high in periods in which inflation is high in order to compensate the creditor. On the other hand, assuming that causality runs from interest rates to inflation and wages, this is broadly consistent with the Kaleckian mechanism, for higher interest rates would induce firms to increase prices in order to compensate the higher interest payments they face. In their turn, workers demand (and in this case receive) higher nominal wages to offset the decline in real wages. On the other hand, the coefficients of the monetary policy deviations show a sign that is theoretically consistent with the current view of monetary policy dynamics since monetary tightening is associated with lower prices and wages. This highlights the importance of distinguishing the monetary policy stance from the endogenous movements in the nominal interest rate. In the case of stock prices, its coefficients show the expected sign in both panels: loose monetary policy boosts stock prices. Finally, the coefficients of unemployment seem odd since higher interest rates and tighter monetary policy are associated with a decrease in the unemployment rate.

Table 6. Correlation between monetary policy indicators and channel indicators, 1980-2010

	Interest rate				Deviations from monetary policy rule			
	stock	nw_gr	unemp	inf	stock	nw_gr	unemp	inf
mp	-1.3903	0.2490***	-0.1348***	0.2831***	-2.8165***	-0.1094**	-0.0420**	-0.4900***
	(1.1612)	(0.0568)	(0.0209)	(0.0482)	(1.0972)	(0.0509)	(0.0207)	(0.0373)
lag1.mp	-1.0795	0.0884*	0.0006	0.1332***	-2.0773**	0.1724***	-0.0183	0.0812**
	(1.1126)	(0.0535)	(0.0219)	(0.0449)	(0.9990)	(0.0529)	(0.0253)	(0.0362)
lag2.mp	-1.4158	-0.0329	0.0253	-0.0239	-1.1494	0.0472	0.0004	0.0202
	(1.0019)	(0.0501)	(0.0197)	(0.0438)	(0.9896)	(0.0478)	(0.0199)	(0.0360)
gdp_gr	0.1551				0.4836			
	(0.6027)				(0.5589)			
inf	0.4015				-2.3162*			
	(1.2466)				(1.2045)			
lag1.inf		0.1149**	0.0001			0.2928***	-0.0053	
		(0.0542)	(0.0195)			(0.0550)	(0.0260)	
com_inf				0.0143***				-0.0009
				(0.0038)				(0.0027)
lag1.com_inf		-0.0037				-0.0004		
		(0.0039)				(0.0041)		
unemp		-0.0015				-0.1027		
		(0.0971)				(0.0886)		
gdp_gap		0.8959**	-1.7655***	0.8143***		1.5258***	-2.0353***	2.6422***
		(0.4446)	(0.1957)	(0.3088)		(0.4323)	(0.2075)	(0.2627)
gdp_pc			-0.0466***				-0.0530***	
			(0.0140)				(0.0151)	
rw_gr			0.0080				0.0116	
			(0.0126)				(0.0143)	
Obs	331	331	331	331	331	331	331	331
Countries	12	12	12	12	12	12	12	12

Notes: *mp* is *int* and *dev_tay* in the left and right panel, respectively. First differenced GLS estimations allowing individual specific AR(1) process and heteroskedasticity in the error terms. Robust standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* and *lag2.x* refer to the first and second lag of variable x, respectively. All variables are first differences. Dependent variables are *stock*, *nw_gr*, *unemp*, and *inf*, in this order in each panel.

6.2. Evidence across monetary periods

In order to compare the link between monetary policy and functional income distribution across monetary periods I estimate specifications 3 and 7 from table 4, specification 5 from table 5 and the eight regressions of table 6 for each monetary period.

Table 7 presents the results of the first differenced GLS regressions for each monetary policy period, where the upper panel uses interest rate variations as the indicator of monetary policy while the bottom panel uses the monetary policy deviations instead. Regarding the controls, it is worth mentioning that GDP per capita shows a consistent positive link with the capital share, suggesting that technology is indeed a major force behind the variations of functional income distribution. Similarly the effect of trade openness is positive and significant in almost all periods. The role of the current account appears to have changed over time, for it affected the capital share negatively during the interwar period and positively in the postwar era. Now, regarding the correlations that are of special interest in this study, table 7 shows that, independently from the sign of the relationship and the monetary policy indicator used, there is a statistically significant link between monetary policy and functional income distribution in every monetary period.

The lagged values of the interest rate are significantly associated with the capital share only during the convertibility phase of the Bretton Woods era and the posterior floating regime. The reason might be that, in their aim of influencing aggregate demand, policymakers used monetary variables more systematically over these years, with the side effect of altering functional income distribution. During the convertibility period of Bretton Woods, higher interest rates leaded to an increase in the capital share, whereas the opposite is true during the floating regime era. The point estimates suggest that a 1-percentage point variation in the interest rate is associated with a significant variation of the capital share bounded between 0.13 and 0.22 percentage points.[16] On the other hand, the link between the monetary policy deviations and the capital share variations is significant up to the 1970s. The correlation is not systematic in the sense that the sign of the cumulative effect of the monetary policy deviations is different in each monetary period. Tighter monetary policy is

[16] The fact that each one of the estimations is performed on different country groups makes a cross-period comparison of the size of the coefficients meaningless. On the other hand, comparing the sign of the estimates across monetary periods is reasonable since capital shares and interest rates have similar evolutions across countries.

associated with a decrease in the capital share during the following monetary periods: gold standard, interwar gold standard, Bretton Woods preconvertibility phase, post Bretton Woods floating regime. Conversely, restrictive monetary policy is correlated with more income being allocated to capital during the interwar general and managed float periods and the Bretton Woods convertibility era. The estimates suggest that a 1-percentage point variation of the monetary policy stance is correlated with significant movements in the capital share that are bounded between 0.04 and 0.15 percentage points.

Table 7. Correlation between monetary policy indicators and capital share across monetary policy periods, 1875-2010

Interest rate

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
int	0.1276	0.0836	-0.0506	0.4007*	0.0852	0.0920	-0.0412	0.0249
	(0.1113)	(0.2732)	(0.1095)	(0.2380)	(0.1378)	(0.0774)	(0.0742)	(0.0339)
lag1.int	-0.0348	-0.4390	0.2678*	0.3840*	-0.0294	0.1841**	-0.0702	-0.0686**
	(0.1097)	(0.2723)	(0.1526)	(0.2190)	(0.1708)	(0.0852)	(0.0949)	(0.0306)
lag2.int	0.0064	-0.5490*	-0.2114	-0.1121	0.1704	-0.0322	-0.2187***	-0.1330***
	(0.1075)	(0.3307)	(0.1425)	(0.1157)	(0.1667)	(0.0902)	(0.0698)	(0.0294)
open	0.0643	0.1943***	0.0537**	0.0651***	0.0476***	-0.0163	0.0740	0.0371**
	(0.0476)	(0.0314)	(0.0240)	(0.0174)	(0.0182)	(0.0353)	(0.0462)	(0.0163)
ca	0.0261	-0.0220	-0.1747***	-0.0197	0.0594	0.1883***	0.0981	0.3521***
	(0.0771)	(0.1030)	(0.0266)	(0.0561)	(0.0392)	(0.0589)	(0.0623)	(0.0431)
technology	0.6942	2.6483	4.3817	0.0991	0.0348	-0.2360***	0.6728***	0.2773***
	(0.4940)	(3.4969)	(2.7719)	(2.0511)	(0.1612)	(0.0670)	(0.1497)	(0.0767)
gdp_pc	0.1618***	0.0501	0.1083***	0.1653***	0.1278***	0.2385***	0.1732**	0.1644***
	(0.0326)	(0.0328)	(0.0210)	(0.0189)	(0.0278)	(0.0329)	(0.0682)	(0.0262)
Obs	177	35	43	69	132	127	76	320
Countries	5	8	11	13	14	12	13	12

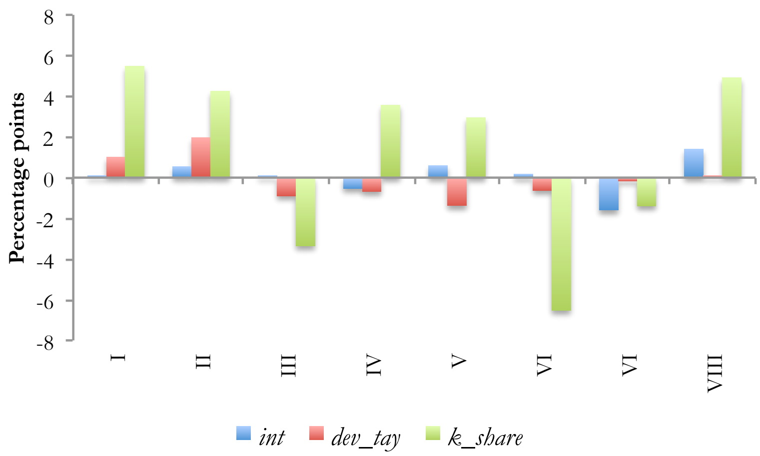
Deviations from the monetary policy rule

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
dev_tay	-0.1033***	0.0918***	-0.0608***	0.0724***	-0.1405***	0.0645	0.0042	0.0382
	(0.0276)	(0.0184)	(0.0094)	(0.0219)	(0.0319)	(0.0491)	(0.0165)	(0.0327)
lag1.dev_tay	-0.1492***	-0.0386***	-0.0815***	0.0134	0.0097	0.1376**	-0.0537***	-0.0111
	(0.0325)	(0.0100)	(0.0167)	(0.0228)	(0.0257)	(0.0597)	(0.0139)	(0.0345)
lag2.dev_tay	-0.0289	0.0769***	-0.0504***	-0.0115	-0.0367	0.0492	-0.0136	-0.0460
	(0.0262)	(0.0085)	(0.0170)	(0.0205)	(0.0230)	(0.0528)	(0.0150)	(0.0321)
open	0.0921*	0.4171***	0.1060***	0.0596***	0.0356*	-0.0189	0.0298	0.0443***
	(0.0479)	(0.0417)	(0.0166)	(0.0145)	(0.0188)	(0.0362)	(0.0390)	(0.0163)
ca	0.0405	0.0102	-0.0743***	-0.0863**	0.0654*	0.1540**	0.0587	0.3303***
	(0.0746)	(0.0713)	(0.0107)	(0.0425)	(0.0367)	(0.0607)	(0.0538)	(0.0438)
technology	0.7379	-2.6902	7.1656***	-0.1277	0.1159	-0.1907***	0.7305***	0.3163***
	(0.4684)	(3.7738)	(1.3266)	(2.1080)	(0.1426)	(0.0652)	(0.1497)	(0.0727)
gdp_pc	0.1672***	0.1706***	0.0327**	0.1923***	0.0976***	0.2108***	0.1075**	0.1849***
	(0.0308)	(0.0375)	(0.0147)	(0.0206)	(0.0270)	(0.0321)	(0.0459)	(0.0253)
Obs	176	34	42	69	121	127	76	320
Countries	5	8	11	13	13	12	13	12

Notes: First differenced GLS estimations allowing individual specific AR(1) process and heteroskedasticity in the error terms. Robust standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* and *lag2.x* refer to the first and second lag of variable x, respectively. Technology refers to *rail* during the gold standard and the interwar periods, to *phone* during the Bretton Woods period, and to *ind_share* during the floating regime era. All variables are first differences. Dependent variable is *k_share*.

Based on the point estimates, figure 2 shows the contribution of changes in monetary policy to movements in the capital share for a hypothetically average country. The contribution is calculated as the change of the cross-country mean of the interest rate and the monetary policy deviations between the first and last year of each monetary period multiplied by the respective sum of contemporaneous and lagged coefficients of the monetary policy indicators, independently of their statistical significance. The economic effect of monetary policy is relatively minor (but nontrivial) when it comes to explaining the evolution of functional income distribution. Interestingly, the direction of the contribution of monetary policy is sometimes contrary to the evolution of the capital share.

Figure 2. Contribution of changes in monetary policy to capital share movements across monetary periods, 1875-2010
Percentage points



Note: I= Gold standard, II= Interwar general float, III= Interwar gold standard, IV= Interwar managed float, V= Bretton Woods preconvertibility, VI= Bretton Woods convertibility, VII= Aggressive monetary policy, VIII= Moderate monetary policy. The green bar corresponding to *k_share* shows the total change of the capital share within each monetary period.
Source: see text.

Table 8 presents the assessment of the channels through which monetary policy may influence functional income distribution. Across all monetary periods, but the Bretton Woods convertibility era, there is at least one significant channel. In general, the coefficients of the significant variables show the expected sign. There is a consistent negative link between the nominal wage and the capital share, whereas stock prices and inflation, which reflect profits, are positively correlated with the capital share (except in the case of few statistically insignificant estimates). The sign of the coefficients of unemployment seems odd since higher unemployment is associated with a capital share reduction. In theory, for a given wage and output, higher unemployment should be associated with lower aggregate labor costs, implying a positive relationship between unemployment and the capital share. However, unemployment might be interpreted as a negative proxy for profits provided that firms act according to microeconomic theory, employing labor as long as the difference between the marginal benefit and the marginal cost of doing so is nonnegative. In other words, firms' profits and labor demand should be positively associated for a given wage, which makes a negative relationship between aggregate profits and aggregate unemployment plausible at the macro level. The fact that unemployment turns to be statistically significant when inflation is not significant supports this interpretation. The size of the coefficients suggests that the significant association between a 1-percentage point increase in stock prices is an increase in the capital share bounded between 0.005 and 0.009 percentage points. Such a low point estimate reflects that the gains and losses associated with stock prices represent a small fraction of the total capital share. The correlation between the nominal wage and the capital share is bounded between 0.04 and 0.16 percentage points of decrease in the latter in face of a 1-percentage point increase in the former. Similarly, a 1-percentage point increase in unemployment is associated with a decrease in the capital share between 0.14 and 0.35 percentage points, while the associated positive effect of 1-percentage point higher inflation on the capital share is bounded between 0.07 and 0.16 percentage points, all else equal.

Table 8. Correlation between channel indicators and capital share across monetary periods, 1875-2010

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
stock	-0.0064	-0.0079	0.0088***	-0.0026	-0.0021	0.0023	0.0068***	0.0054***
	(0.0099)	(0.0146)	(0.0022)	(0.0032)	(0.0040)	(0.0040)	(0.0023)	(0.0013)
nw_gr	-0.0748***	-0.1580***	-0.0346	-0.0157	-0.0618*	-0.0386	-0.0148	-0.0400*
	(0.0243)	(0.0497)	(0.0242)	(0.0377)	(0.0329)	(0.0384)	(0.0347)	(0.0220)
unemp	-0.0265			-0.1366***	-0.0004	-0.0279	-0.3466**	-0.0037
	(0.0739)			(0.0227)	(0.0530)	(0.0581)	(0.1739)	(0.0671)
inf	0.0647**	0.1251***	0.0417	-0.0224	0.1585***	0.0268	-0.0281	0.0006
	(0.0282)	(0.0447)	(0.0254)	(0.0424)	(0.0400)	(0.0616)	(0.0287)	(0.0331)
open	-0.1794***	0.0452	0.1281***	0.0471***	0.0491***	0.0688*	0.1355***	0.0626***
	(0.0555)	(0.0482)	(0.0338)	(0.0157)	(0.0137)	(0.0404)	(0.0400)	(0.0164)
ca	0.2998***	-0.4285***	-0.1138***	0.0263	0.0898**	0.0630	0.1854*	0.3206***
	(0.0953)	(0.1335)	(0.0355)	(0.0804)	(0.0358)	(0.0866)	(0.0969)	(0.0404)
technology	0.8819	-10.3766**	4.8015*	-3.0400*	0.1134	-0.2789***	0.5470***	0.2611***
	(0.5931)	(4.8369)	(2.7991)	(1.7019)	(0.1298)	(0.0808)	(0.1786)	(0.0764)
gdp_pc	0.2223***	-0.1647***	0.1051***	0.0589*	0.1647***	0.1972***	0.0597	0.1690***
	(0.0447)	(0.0607)	(0.0311)	(0.0337)	(0.0319)	(0.0444)	(0.0625)	(0.0245)
gdp_gap	0.7159	4.1430***	-0.4283	1.3187**	0.9604*	1.8868**	1.9956**	0.9902***
	(0.7657)	(0.8690)	(0.3954)	(0.6827)	(0.4984)	(0.8397)	(0.9554)	(0.3357)
Obs	63	36	55	56	90	110	82	336
Countries	2	7	10	9	9	10	13	12

Notes: First differenced GLS estimations allowing individual specific AR(1) process and heteroskedasticity in the error terms. Robust standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. Technology refers to *rail* during the gold standard and the interwar periods, to *phone* during the Bretton Woods period, and to *ind_share* during the floating regime era. All variables are first differences. Dependent variable is *k_share*.

Tables A4 through A7 shown in the appendix contain the estimated correlation between monetary policy and channel indicators. In each one of the tables, the monetary policy indicator used in the upper panel is the interest rate, whereas the one included in the bottom panel is the monetary policy deviations. There is a significant link between monetary policy and stock prices in every monetary period, and generally the coefficients show the expected negative sign. The coefficients of the interest rate tend to be greater than those of the monetary policy deviations. Regarding the nominal wage, there seems to be a positive correlation with contemporaneous values of the interest rate, which can be interpreted as a signal of reverse causality or the response of wages to higher prices induced by increased firms' interest payments, as explained earlier. On the other hand, the coefficients of the contemporaneous values of the monetary policy deviations are significant and of the expected sign in all monetary periods. In the case of unemployment, its link to monetary policy comes mainly through the monetary policy deviations. The cumulative effects show the expected positive sign in all but the moderate monetary policy period. Finally, there is a significant negative cumulative correlation between the monetary policy deviations and inflation in all monetary periods, as expected. Conversely, in some sub-samples contemporaneous values of the interest rate are positively associated with inflation, which could support the hypothesis that firms increase prices in order to compensate higher interest payments.

6.3. Estimation concerns

There are some concerns about the validity of the analysis performed so far. The first major uncertainty arises from the limitation associated with the variables included in the model. Several variables were used as proxies for capturing concepts that are difficult to measure accurately, which could result in misleading interpretations if those variables reflect a different feature from the intended. In particular, the measurement of the monetary policy stance is a source of uncertainty. Monetary policy rules may not be an ideal measure of the monetary policy stance because they cannot take into account all the factors that affect the economy such as movements in the exchange rate, stock market, and political developments, among others (Carare and Tchaidze, 2005). Also, there are estimation issues such as serial correlation and the assumption of linear relationship among the variables. Furthermore, when estimating the deviations from the monetary policy rule, I impose the response coefficients of one monetary period to the others without accounting for changes in the structure of the economy. I cannot rule out the risk that all these issues may have leaded me to wrong conclusions about the nature of the monetary policy. Likewise, the selection of the nominal interest rate as the indicator of monetary policy could be criticized. Indeed, Hein and Schoder (2011) argue that since central banks take inflation into account when setting the nominal interest rate, what they do in reality is vary the nominal interest rate in order to affect the real interest rate and reach their targets.[17]

In order to check if the previous results were biased by the selection of the monetary policy indicators, table 9 uses the ex-post short-term real interest rate and the deviations from the monetary policy rule estimated following Romer and Romer's (2002) procedure as proxies for monetary policy. The significance of the correlation between the real interest rate and factor shares is greater than that of the nominal interest rate in the gold standard and the interwar period, and lower in the moderate monetary policy period. While the sign of the coefficients remain the same, their size tends to be larger when the nominal interest rate is used as a proxy. The negative correlation between the real interest rate and the capital share during the aggressive monetary policy period is consistent with Jayadev's (2007) finding of a positive association between real interest rates and labor shares. Moreover, the fact that I do not find a statistical correlation between the real interest rate and the capital share in the moderate monetary policy period is somehow consistent with Stockhammer (2009), who does not find a consistent relationship either. On the other hand, although the real monetary policy deviations (those estimated using Romer and Romer's (2002) procedure) are significant in 5 out 8 monetary periods, this measure of monetary policy stance tends to be less correlated with the capital share than the nominal monetary policy deviations (those estimated using Taylor's (1998) procedure). The cumulative effect of the real monetary policy deviations takes the same sign of the nominal monetary policy deviations, except in the Bretton Woods preconvertibility era. The size of the cumulative effects is similar, although in 5 out of 8 monetary periods the magnitude of the effect of the nominal monetary policy deviations is greater. Despite the differences just described, the statistical correlation between monetary policy and functional income distribution is robust to the monetary policy indicators chosen.

[17] The literature is not uniform in this respect. For instance, Argitis and Pitelis (2001) use the nominal interest rate, whereas Hein and Schoder (2011) use a proxy for the long-term real interest rate.

Table 9. Correlation between alternative monetary policy indicators and capital share across monetary periods, 1875-2010

Real interest rate

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
r_int	-0.0679***	0.0758***	-0.0599***	0.0432*	-0.0206	-0.0318	-0.0102	0.051
	(0.0221)	(0.0250)	(0.0196)	(0.0241)	(0.0203)	(0.0317)	(0.0194)	(0.0325)
lag1.r_int	-0.0863***	-0.0417**	-0.0610**	0.0254	0.0257	0.0706*	-0.1111***	0.0240
	(0.0255)	(0.0167)	(0.0236)	(0.0214)	(0.0195)	(0.0375)	(0.0168)	(0.0340)
lag2.r_int	-0.0127	0.6761***	-0.0282*	-0.0408**	0.0443**	0.0723**	-0.0227	-0.0151
	(0.0209)	(0.0124)	(0.0163)	(0.0206)	(0.0181)	(0.0318)	(0.0179)	(0.0316)
open	0.0218	0.3173***	0.0918***	0.0507***	0.0578***	-0.00123	0.2157***	0.0454***
	(0.0456)	(0.0439)	(0.0248)	(0.0143)	(0.0216)	(0.0389)	(0.0650)	(0.0163)
ca	0.0901	-0.1444	-0.0717***	-0.0747	0.0536*	0.1904***	0.1291**	0.3277***
	(0.0773)	(0.1021)	(0.0203)	(0.0621)	(0.0311)	(0.0658)	(0.0613)	(0.0436)
technology	0.6832	-0.7862	7.2139***	-1.2234	-0.1121	-0.1849***	0.4075**	0.3180***
	(0.4471)	(4.0359)	(1.7601)	(2.0067)	(0.1313)	(0.0662)	(0.1792)	(0.0724)
gdp_pc	0.1902***	0.1791***	0.0565***	0.1728***	0.1231***	0.2390***	0.0205	0.1904***
	(0.0296)	(0.0411)	(0.0211)	(0.0264)	(0.0254)	(0.0330)	(0.0538)	(0.0253)
Obs	143	35	43	70	120	115	65	320
Countries	4	8	11	13	14	12	13	12

Deviations from the monetary policy rule

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
dev_rom	-0.0318	0.0054	0.0158	0.0568	0.0327	0.0155	-0.0036	-0.0001
	(0.0425)	(0.0098)	(0.0146)	(0.0367)	(0.0293)	(0.0583)	(0.0116)	(0.0321)
lag1.dev_rom	-0.0333	-0.0052	-0.0038	0.1080***	0.0705***	0.0553	-0.0767***	-0.0357
	(0.0612)	(0.0040)	(0.0247)	(0.0384)	(0.0258)	(0.0746)	(0.0101)	(0.0402)
lag2.dev_rom	-0.0208	0.0720***	-0.1033***	-0.0077	0.0741***	0.0938*	-0.0163*	0.0206
	(0.0429)	(0.0038)	(0.0230)	(0.0320)	(0.0246)	(0.0549)	(0.0094)	(0.0309)
open	0.0096	0.2536***	0.0439	0.0460***	0.0530**	0.0143	0.1958***	0.0466***
	(0.0516)	(0.0185)	(0.0328)	(0.0134)	(0.0244)	(0.0389)	(0.0586)	(0.0163)
ca	0.0237	-0.1811***	-0.1766***	-0.0147	0.0507	0.1375**	0.0813	0.3210***
	(0.0855)	(0.0436)	(0.0646)	(0.0641)	(0.0314)	(0.0680)	(0.0650)	(0.0430)
technology	0.8091	-2.4414	7.1602***	0.4183	0.0282	-0.1970***	0.5411***	0.3372***
	(0.5078)	(4.3790)	(2.4074)	(2.2323)	(0.1301)	(0.0652)	(0.1533)	(0.0714)
gdp_pc	0.2045***	0.0734***	0.0724***	0.1371***	0.1508***	0.2605***	-0.0405	0.1896***
	(0.0330)	(0.0118)	(0.0206)	(0.0189)	(0.0264)	(0.0351)	(0.0502)	(0.0247)
Obs	123	32	31	63	103	115	65	316
Countries	4	7	8	12	13	12	13	12

Notes: First differenced GLS estimations allowing individual specific AR(1) process and heteroskedasticity in the error terms. Robust standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* and *lag2.x* refer to the first and second lag of variable x, respectively. All variables are first differences. Dependent variable is *k_share*.

Given that the baseline estimations were performed without time fixed effects, the possibility that the findings are particular to the specific model used is a second important concern. Table 10 presents the results when year dummies are included as regressors and shows that time effects should be included in all but one regression, according to the test of joint significance of the year dummies. The observed variations with respect to the baseline results are not systematic. The sign of the coefficients of the interest rate is typically the same and their size does not change dramatically. This indicator becomes more significant in the interwar gold standard and managed float periods and in the Bretton Woods preconvertibility phase. Conversely, the correlation becomes weaker in the post Bretton Woods floating regime. Regarding the monetary policy deviations, the statistical significance of the correlation becomes weaker over the period 1875-1931 and, more importantly, it vanishes in the interwar gold standard and the Bretton Woods preconvertibility periods. The size of the coefficients of the monetary policy deviations is lower with time fixed effects, but their sign remains generally the same. All this suggests that the statistical correlation between monetary policy and functional income distribution becomes somehow weaker when year dummies are introduced. Nevertheless, at least one statistically significant coefficient remains in each of the monetary periods. Of course, the interpretation of the year dummies remains an issue. Studies such as IMF (2007) interpret time effects as technological progress, but in this context where most variables suffer from measurement problems, it is not possible to attribute time effects exclusively to technological change (Stockhammer, 2009).

Table 10. Correlation between monetary policy indicators and capital share across monetary periods (including time fixed effects), 1875-2010

	Interest rate							
		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
int	0.0966	0.1751	-0.0680	0.3575	-0.1812	-0.0356	-0.0831	0.0219
	(0.1350)	(0.2757)	(0.1624)	(0.2354)	(0.1642)	(0.0853)	(0.0940)	(0.0377)
lag1.int	-0.0297	-0.1900	0.0934	0.6079***	0.1859	0.1303	-0.1245	-0.0787**
	(0.1432)	(0.3577)	(0.1273)	(0.2105)	(0.1758)	(0.0824)	(0.1027)	(0.0320)
lag2.int	-0.1315	0.1926	0.2243**	-0.1705	0.4776***	-0.0775	-0.2575**	-0.0526
	(0.1281)	(0.1914)	(0.0961)	(0.1267)	(0.1830)	(0.0873)	(0.1022)	(0.0337)
open	-0.1431**	0.1814***	-0.0170	0.0417**	0.0241	-0.0520	0.1283**	0.0727***
	(0.0585)	(0.0361)	(0.0156)	(0.0179)	(0.0192)	(0.0327)	(0.0533)	(0.0208)
ca	0.0204	-0.0738	-0.1048***	-0.0453	0.0267	0.1673***	0.1398**	0.3056***
	(0.0780)	(0.0953)	(0.0262)	(0.0676)	(0.0365)	(0.0503)	(0.0650)	(0.0438)
technology	-0.2316	-4.7500	8.3133***	0.9385	0.1730	-0.5243***	0.8959***	0.3126***
	(0.6768)	(3.9117)	(2.6410)	(1.9279)	(0.2196)	(0.1327)	(0.2012)	(0.0828)
gdp_pc	0.1462***	0.0398	0.0011	0.1650***	0.0894***	0.2103***	0.2374***	0.1917***
	(0.0334)	(0.0602)	(0.0268)	(0.0287)	(0.0245)	(0.0286)	(0.0690)	(0.0299)
TE test	0.0000	0.0000	0.0000	0.0031	0.0000	0.0000	0.1413	0.0000
Obs	141	35	43	69	132	127	78	320
Countries	4	8	11	13	14	12	13	12

	Deviations from the monetary policy rule							
		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
dev_tay	-0.0480	0.0442	0.0121	0.1243***	-0.0143	0.0298	-0.0050	0.0433
	(0.0296)	(0.0272)	(0.0132)	(0.0207)	(0.0198)	(0.0490)	(0.0177)	(0.0348)
lag1.dev_tay	-0.0757**	-0.0380*	0.0183	0.0130	0.0004	0.1251**	-0.0547***	-0.0200
	(0.0381)	(0.0199)	(0.0186)	(0.0213)	(0.0208)	(0.0534)	(0.0141)	(0.0353)
lag2.dev_tay	-0.0143	0.0418***	0.0016	-0.0096	-0.0106	0.0558	-0.0156	0.0092
	(0.0294)	(0.0160)	(0.0139)	(0.0208)	(0.0181)	(0.0461)	(0.0153)	(0.0334)
open	-0.1293**	0.3012***	-0.0124	0.0567***	0.0142	-0.0543	0.0376	0.0795***
	(0.0581)	(0.0562)	(0.0244)	(0.0191)	(0.0200)	(0.0345)	(0.0511)	(0.0206)
ca	0.0524	-0.0515	-0.1410***	-0.0413	0.0523	0.1387***	0.0703	0.2871***
	(0.0778)	(0.0627)	(0.0295)	(0.0651)	(0.0363)	(0.0506)	(0.0635)	(0.0420)
technology	0.0758	-7.8694**	8.7610***	0.5207	0.1495	-0.5310***	0.8133***	0.3346***
	(0.6667)	(3.9065)	(2.3262)	(1.987)	(0.2297)	(0.1356)	(0.2194)	(0.0794)
gdp_pc	0.1590***	0.1086***	0.0271	0.1670***	0.0884***	0.1760***	0.1953***	0.2035***
	(0.0321)	(0.0388)	(0.0305)	(0.0248)	(0.0242)	(0.0297)	(0.0741)	(0.0289)
TE test	0.0001	0.0007	0.0000	0.0000	0.0000	0.0000	0.0583	0.0000
Obs	140	34	42	69	132	127	78	320
Countries	4	8	11	13	14	12	13	12

Notes: First differenced GLS estimations allowing individual specific AR(1) process and heteroskedasticity in the error terms. Robust standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* and *lag2.x* refer to the first and second lag of variable x, respectively. TE test refers to the p-value corresponding to the Wald test of joint significance of year dummies. All variables are first differences. Dependent variable is *k_share*.

A final major concern is that the estimation method was not able of coping with all the problematic properties of the data. In particular, the previous estimates did not account for the cross-section dependence that results from common shocks and unobserved components that become part of the error term. It is not surprising that the panels are interdependent since they correspond to interconnected economies.[18] Moreover, this problem is not unique to this study since little attention has been given to this issue in studies that analyze functional income distribution (Dünhaupt (2013) is an exception).

The impact of cross-section correlation depends on various factors, such as its nature and the magnitude of the correlations across panels (De Hoyos and Sarafidis, 2006). Under certain assumptions, the presence of cross-section dependence would not make the parameters inconsistent, but it could lead to inconsistent estimates of standard errors.[19] One option for handling cross-section dependence in the error terms is performing an OLS within fixed effects estimation using Driscoll-Kraay standard errors that assume heteroskedasticity and autocorrelation in the error terms and are robust to cross-sectional dependence. Nevertheless, this standard error estimator is based on large T asymptotics and its final sample properties may be quite poor when N and T are of comparable orders of magnitude (Driscoll and Kraay, 1998). Given that in all monetary periods (except for the gold standard and the moderate monetary policy periods) the cross-sectional dimension is greater than the time dimension, this approach is not ideal in our case.[20] Having this caveat in mind, table 11 presents the results of the OLS within fixed-effects estimator using Driscoll-Kraay standard errors. The overall statistical significance of the coefficients of the interest rate is similar with both estimation methods, although it seems marginally less significant over the post Bretton Woods period in the OLS case. The sign of the cumulative effect of the interest rate remains the same, and its magnitude does not change dramatically. With respect to the monetary policy deviations, the significance of its coefficients is similar, except in the interwar gold standard and managed float periods, where it vanishes. The sign of the cumulative effect remains the same in all samples but the moderate monetary policy period, and the magnitude of the effect is quite similar. Thus, it

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18 The exchange rate could be a special channel through which countries interact in this setting, for it is obviously correlated to monetary policy.

19 If the unobserved variable that causes cross-section dependence is not correlated with the regressors, the estimates would not be biased, but the standard errors would. On the other hand, if the unobserved element were correlated with the regressors, the estimated coefficients and standard errors would be biased.

20 This is especially problematic in the monetary periods with small number of years such as the interwar period and the aggressive monetary policy period.

seems that, in this particular case, not having accounted for cross-section dependence did not result in misleading inferences.[21]

Table 11. Correlation between monetary policy indicators and capital share across monetary periods (within fixed effects estimations using Driscoll-Kraay standard errors), 1875-2010

Interest rate

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
int	0.2179*	0.3564*	-0.1737	0.2604	-0.0835	0.0481	-0.2006	0.0562
	(0.1076)	(0.1572)	(0.3568)	(0.5093)	(0.2569)	(0.0685)	(0.1219)	(0.0390)
lag1.int	0.0715	-0.6752**	0.1295	0.3881	-0.1435	0.1050	-0.2464**	-0.0486
	(0.1177)	(0.1618)	(0.3065)	(0.2649)	(0.2210)	(0.0595)	(0.0810)	(0.0481)
lag2.int	0.0561	-0.2760	-0.2958	-0.2918	0.3296**	-0.0223	-0.4059**	-0.1220***
	(0.1164)	(0.1654)	(0.3791)	(0.1615)	(0.1318)	(0.0473)	(0.1365)	(0.0319)
open	0.0525	0.1657***	0.0497	0.0590**	0.0706***	-0.0484	0.1650**	0.0366**
	(0.0475)	(0.0165)	(0.0411)	(0.0170)	(0.0164)	(0.0867)	(0.0621)	(0.0174)
ca	0.0049	-0.0098	-0.1384*	-0.0304	0.1130***	0.1550***	0.2701	0.3275***
	(0.1222)	(0.1153)	(0.0488)	(0.0445)	(0.0218)	(0.0483)	(0.1388)	(0.0359)
technology	-0.1751	-24.3402***	13.5217**	3.0156	0.4209	-0.1104	0.6727	0.3124***
	(0.5780)	(4.2459)	(2.2756)	(4.1108)	(0.3258)	(0.1786)	(0.3632)	(0.0534)
gdp_pc	0.1784***	0.0621*	0.0528	0.1373***	0.0885**	0.2309***	0.1567*	0.1549***
	(0.0277)	(0.0275)	(0.03823)	(0.0320)	(0.0324)	(0.0322)	(0.0650)	(0.0477)
constant	0.1569	1.8229***	-0.8677	0.1019	-0.4071	-0.0058	0.4411	0.1866**
	(0.1548)	(0.2068)	(0.6421)	(0.1306)	(0.2393)	(0.2188)	(0.2378)	(0.0845)
Within R-sq	0.2000	0.6239	0.3028	0.2308	0.1550	0.2463	0.3430	0.4229
Obs	141	35	43	69	132	127	76	320
Countries	4	8	11	13	14	12	13	12

Deviations from the monetary policy rule

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
dev_tay	-0.0873**	0.0551	-0.0398	0.0875	-0.1387**	0.0431	0.0053	0.0584
	(0.0337)	(0.0270)	(0.0228)	(0.0554)	(0.0562)	(0.0303)	(0.0201)	(0.0457)
lag1.dev_tay	-0.1056***	-0.0342***	-0.0453	0.0231	-0.0000	0.0913**	-0.0591***	0.01804
	(0.0258)	(0.0070)	(0.0390)	(0.0351)	(0.0219)	(0.0397)	(0.0141)	(0.0384)
lag2.dev_tay	-0.0194	0.0565***	-0.0305	0.0128	-0.0296	-0.0448	-0.0103	-0.0220
	(0.0283)	(0.0040)	(0.0270)	(0.0307)	(0.0448)	(0.0912)	(0.0058)	(0.0484)
open	0.0405	0.3516***	0.0778*	0.0600**	0.0526**	-0.0418	0.0600	0.0432**
	(0.0516)	(0.0641)	(0.0291)	(0.0188)	(0.0221)	(0.0686)	(0.0653)	(0.0197)
ca	0.0248	-0.0289	-0.0827	-0.0422	0.1003***	0.1552***	0.0407	0.3071***
	(0.0248)	(0.0634)	(0.0815)	(0.1427)	(0.0191)	(0.0392)	(0.0531)	(0.0452)
technology	0.1089	-21.8942***	15.6017**	-4.3576	0.1926	-0.0935	0.8019*	0.3726***
	(0.6629)	(3.6833)	(4.3422)	(3.5731)	(0.2365)	(0.1567)	(0.3681)	(0.0597)
gdp_pc	0.1856***	0.1545***	0.0180	0.1681***	0.0742	0.2263***	0.0525	0.1709***
	(0.0289)	(0.0311)	(0.0631)	(0.0368)	(0.0414)	(0.0211)	(0.1015)	(0.0457)
constant	0.1188	1.3202***	-0.8705	0.3173*	-0.1216	0.0178	0.0197	0.2385**
	(0.1635)	(0.1820)	(0.5859)	(0.1753)	(0.1577)	(0.1915)	(0.6343)	(0.0977)
Within R-sq	0.2564	0.7350	0.3024	0.2948	0.2536	0.2651	0.5694	0.3977
Obs	140	34	42	69	121	127	76	320
Countries	4	8	11	13	13	12	13	12

Notes: First differenced OLS within fixed-effects estimations. Driscoll and Kraay standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* and *lag2.x* refer to the first and second lag of variable x, respectively. All variables are first differences. Dependent variable is *k_share*.

Finally, applying panel corrected standard errors (PCSE) is an alternative to GLS when the panel data has the characteristics described above. Table 12 shows the Prais-Winsten estimates assuming that the errors are heteroskedastic and contemporaneously correlated across panels, and the presence of individual autocorrelation in each panel. The significance of the interest rate coefficients is quite similar whereas that of the monetary policy

[21] Note that the only reliable estimates of the OLS method using Driscoll-Kraay standard errors are those of the gold standard period and the moderate monetary policy period because they are characterized by large T. The results are quite similar to those estimated by GLS.

deviations is a little lower. The sign of the estimates is the same and their size is slightly larger when estimated with PCSE. [22] All in all, the results do not change dramatically when different estimation methods are applied.

Table 12. Correlation between monetary policy indicators and capital share across monetary periods (panel corrected standard errors), 1875-2010

Interest rate

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
int	0.0009	0.0269	-0.0328	0.3200	-0.0738	0.1158	-0.1531	0.0338
	(0.1387)	(0.3181)	(0.2327)	(0.3853)	(0.1809)	(0.1271)	(0.1060)	(0.0415)
lag1.int	-0.1106	-0.7203**	0.3981*	0.6785**	-0.0822	0.1649	-0.1710	-0.0682*
	(0.1338)	(0.3626)	(0.2311)	(0.3372)	(0.2125)	(0.1327)	(0.1360)	(0.0380)
lag2.int	-0.0518	-0.8209*	-0.1341	-0.2749	0.3386	0.0165	-0.3258**	-0.1363***
	(0.1306)	(0.4349)	(0.2446)	(0.1851)	(0.2248)	(0.1395)	(0.1498)	(0.0369)
open	0.1894***	0.1801***	0.0751**	0.0534**	0.0711**	-0.0444	0.1828***	0.0460**
	(0.0624)	(0.0360)	(0.0366)	(0.0227)	(0.0279)	(0.0511)	(0.0678)	(0.0198)
ca	-0.0156	-0.0469	-0.1524***	-0.0423	0.0945**	0.1138	0.2039**	0.3419***
	(0.1009)	(0.1063)	(0.0299)	(0.1208)	(0.0457)	(0.0836)	(0.0948)	(0.0465)
technology	0.4759	-1.2231	7.7240	1.9549	-0.0522	-0.2061**	0.7366	0.2259**
	(0.5869)	(4.6564)	(5.5401)	(2.4821)	(0.2682)	(0.0917)	(0.4643)	(0.0894)
gdp_pc	0.1381***	0.0905	0.0652*	0.1468***	0.1015***	0.2097***	0.1591	0.1442***
	(0.0424)	(0.0542)	(0.0362)	(0.0416)	(0.0316)	(0.0429)	(0.1542)	(0.0305)
R Sq	0.1480	0.5234	0.3643	0.3173	0.1487	0.2612	0.3189	0.4181
Obs	177	35	43	69	132	127	76	320
Countries	5	8	11	13	14	12	13	12

Deviations from the monetary policy rule

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
dev_tay	-0.1613***	0.0882***	-0.0504*	0.0770**	-0.1560***	0.0659	0.0023	0.0419
	(0.0299)	(0.0311)	(0.0268)	(0.0377)	(0.0401)	(0.0650)	(0.0211)	(0.0393)
lag1.dev_tay	-0.2124***	-0.0310**	-0.0640	0.0237	0.0143	0.1352*	-0.0595***	-0.0024
	(0.0339)	(0.0150)	(0.0437)	(0.0312)	(0.0316)	(0.0765)	(0.0140)	(0.0412)
lag2.dev_tay	-0.0522	0.0758***	-0.0452	0.0009	-0.0321	0.0222	-0.0114	-0.0332
	(0.0274)	(0.0134)	(0.0363)	(0.0285)	(0.0282)	(0.0725)	(0.0158)	(0.0390)
open	0.1438***	0.4037***	0.1144***	0.0530**	0.0511**	-0.0478	0.0774	0.0550***
	(0.0509)	(0.0659)	(0.0343)	(0.0221)	(0.0221)	(0.0514)	(0.0685)	(0.0213)
ca	0.0521	-0.0567	-0.0848*	-0.0385	0.0923***	0.1159	0.0594	0.3277***
	(0.0874)	(0.0786)	(0.0468)	(0.1298)	(0.0358)	(0.0822)	(0.0698)	(0.0474)
technology	0.6821	-6.2670	8.3527	1.7348	0.0759	-0.1623**	0.7648***	0.2550***
	(0.5091)	(5.0804)	(5.1718)	(2.8270)	(0.1697)	(0.0782)	(0.2710)	(0.0898)
gdp_pc	0.1465***	0.1759***	0.0367	0.1715***	0.0660**	0.1953***	0.0395	0.1631***
	(0.0363)	(0.0427)	(0.0379)	(0.0457)	(0.0301)	(0.0426)	(0.0806)	(0.0317)
R Sq	0.3097	0.7124	0.3758	0.3028	0.2742	0.2494	0.5811	0.3875
Obs	176	34	42	69	121	127	76	320
Countries	5	8	11	13	13	12	13	12

Notes: First differenced Prais-Winsten estimations. Panel corrected standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* and *lag2.x* refer to the first and second lag of variable x, respectively. All variables are first differences. Dependent variable is *k_share*.

6.4. Discussion

The results suggest that monetary policy indeed influences functional income distribution through its impact on asset prices, wages, unemployment, and profits. However, the sign of the correlation and the channels that explain this correlation have changed over time,

[22] This method also suffers from caveats especially in the presence of substantial persistence in the explanatory variables and serial correlation in the errors. Furthermore, in some practical situations the PCSE estimator is less efficient than GLS (Reed and Webb, 2010).

implying that the link is not systematic. In fact, in some periods monetary policy is linked to a greater fraction of income being allocated as capital returns while in others it is associated with larger workers' compensation. Our findings are comparable to those of other studies as far as they are concerned to the correlation between the interest rate and the capital share over 1959-2010. To the best of my knowledge, the remaining estimations are not directly comparable with other studies. The results corresponding to the post Bretton Woods period are consistent with Argitis and Pitelis (2001) who find that the nominal interest rate affects negatively the industrial profit share in the U.S. and the U.K. However, the fact that the coefficient of the interest rate is positive during the Bretton Woods convertibility era suggests that estimating a single linear relation over a relatively large period of time, as Argitis and Pitelis (2001) do, could lead to ignoring important evidence. On the other hand, the negative correlation between the interest rate and the capital share in the post Bretton Woods era is at odds with Hein and Schoder (2011), who find that interest payments are positively correlated to the profit share. It is also contrary to Dünhaupt (2013), who finds that interest payments, under certain specifications, affect negatively the labor share. The crucial difference is that I used the interest rate as a proxy for interest payments because of data availability, whereas Hein and Schoder (2011) and Dünhaupt (2013) use the ratio of interest payments to the capital stock of non-financial business sector.

Regarding the transmission channels that explain this correlation, the nominal wage and inflation appear to be the main channels during the gold standard regime and the interwar general float period, whereas the role of unemployment is significant over the 1970s, and stock prices are important during the moderate monetary policy period. These results are consistent with previous findings. For instance, the finding that wages and prices transmitted monetary shocks during the classical gold standard is in line with the argument that wages and prices were very flexible at that time (Officer, 2008). The role of unemployment during the aggressive monetary period is consistent with Blanchard (1998), who argues that the increase of the labor share in Europe during the 1970s was due to the inability of wages to adjust downwards fast enough in response to the slowdown of factor productivity growth. The adjustment came through a downward movement in employment. In addition, as long as stock prices are a good proxy for asset prices, our finding is consistent with the historic rebound of asset prices, which accelerated after 1980 according to Piketty (2014).

Although this paper did not test explicitly whether or not Kaleckian markup dynamics explain the evolution of income distribution, our findings shed some light. Given that some sub-samples show a positive correlation between contemporaneous values of the interest rate and inflation, there is some support for the hypothesis that firms augment prices in order to compensate higher interest payments. The results would be broadly consistent with a Kaleckian interest rate elastic markup if the interest rate is positively correlated with inflation and the capital share, and inflation is correlated to the capital share. No monetary period significantly combines these three features. On the other hand, if the markup is not elastic with respect to the interest rate, a redistribution of income could occur via lower labor costs. In this case, the correlation of the interest rate and the capital share should still be positive, and the correlation between the interest rate and the nominal wage (unemployment) should be negative (positive). Only the gold standard period is consistent with the adjustment taking the form of lower wages, which is a plausible story given the relative flexibility of wages and prices during this period (Officer, 2008). The results do not support the hypothesis of an adjustment via higher unemployment. All in all, in terms of the Kaleckian perspective, our results suggest that if firms were successful in passing higher interest payments onto prices, workers were also successful in offsetting lower real wages through higher nominal wages.

The evidence is in line with the undetermined effect of monetary policy implied by the new Keynesian Phillips curve dynamics. Indeed, the sign of the correlation between the monetary policy deviations and the capital share does not support that the effect of the monetary stance is factor biased. A possible explanation is that the degree of relative flexibility of wages, employment, and profits has changed over time. In periods in which a monetary tightening is associated with a lower capital share, profits could have been more downward responsive than wages. Conversely, when restrictive monetary policy is associated with higher capital share, the labor income could have diminished via lower wages. This implies that the factors that determine the relative flexibility of wages and prices, such as the bargaining power in the labor market play an essential role.

7. Concluding remarks

Analyzing the relationship between monetary policy and functional income distribution is natural since the variables that are altered when monetary policy influences aggregate demand are constituent part of the factor shares. This paper has adopted a general approach by taking an empirical strategy flexible enough to be compatible with both the post Keynesian and the new Keynesian perspectives. The first important finding is the existence of a statistically significant correlation between monetary policy and functional income distribution over the period 1875-2010. This correlation is still evident if one uses slightly different monetary policy indicators, when time effects are considered, and when other estimation methods are used. The second major finding is that the effect of monetary policy is not factor biased, as it benefited capital in some periods and it contributed to the labor share in others. This does not support the hypothesis of an interest rate elastic markup that distributes income in favor of capital. In contrast, it gives room for interpreting this correlation as a side effect of monetary policy.

This investigation raises more questions than those that it answers. In particular, the following questions are inevitable: is the correlation really non-systematic over time?, could other factors that influence both monetary policy and income distribution explain the correlation? It is clear that there is room for a theoretically strong explanation of this correlation, which possibly could be analyzed along the following frameworks. Investigating the role of the interaction between monetary policy and variable markups in a more systematic and general way could be useful. The fact that markups, functional income distribution, and monetary policy have certain cyclical behavior supports the hypothesis that this might be a fruitful area of research (see Rotemberg and Woodford (1999) for a discussion on the cyclical behavior of markups).

If the relative flexibility of prices and wages is indeed the essential element determining the nature of the correlation between monetary policy and functional income distribution, the link between exchange rate regimes and price flexibility could provide a potential explanation for the evolution of the capital share. Indeed, an argument in favor of floating exchange rate regimes is that it allows the economy to absorb shocks better in the presence of nominal rigidities. On the other hand, when the nominal exchange rate is fixed shocks should be absorbed via price variations. Assuming that prices are more flexible under fixed exchange rate regimes could contribute to explain the negative correlation between the monetary policy deviations and the capital share in the classical gold standard, interwar gold standard, and Bretton Woods preconvertibility eras. The negative correlation observed in the post Bretton Woods floating regime period is a puzzle for such a rigid explanation.

Nevertheless, other elements such as the degree of flexibility of the exchange rate and the pervasiveness of capital controls have to be taken into account for providing a theory able of explaining coherently the evolution of monetary policy and functional income distribution. Models of exchange rate regime and endogenous price flexibility could be useful in this regard (see, *e.g.*, Devereux, 2006).

Finally, this paper analyzed the short-run relationship between monetary policy and functional income distribution over an extended time period, but studying the existence of a long-run relationship could be interesting, especially considering the patterns shown in figure 1. This highlights the possibility that the correlation documented in this study reflects other forces correlated to both monetary policy and income distribution or other kinds of relationship between the variables. For instance, the hike observed in the capital share during the moderate monetary policy period is intriguing. This period influences our results since the monetary policy rule used to identify the monetary stance is based on this very time span. The rationale for doing so is that policy makers have been successful in combating inflation over 1980-2010; however, this is probably not a merit of monetary authorities alone as the literature related to the so-called Great Moderation has highlighted. Indeed, the 1980s marked the beginning of the implementation of sustained anti-inflationary monetary policies and the reduction of macroeconomic volatility in the industrialized countries (Summers, 2005). However, changes in other economic institutions, business practices, technology, and other structural characteristics of the economy also took place (Bernanke, 2004). Further research on the Great Moderation and income distribution could prove useful to understand the nature of the correlation documented in this paper.

Although our estimates are based on a very limited number of countries, the results are likely to reflect a worldwide phenomenon given the common trends in income distribution observed across the globe, at least in recent decades.[23] Policymakers should take into account the potential impact of monetary policy on functional income distribution because of its implications in terms of macroeconomic performance and social cohesion. This is especially relevant in today's world where monetary policy is being used as the primary policy tool for addressing the problems that the world economy faces.

[23] Rodriguez and Jayadev (2010) have shown that the labor share has declined persistently since 1980 across the globe.

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Appendix

Table A1. Ex ante real interest rates and output gap for the years selected for detrending real interest rates

Country	Pre WWII			Post WWII		
	Year	Ex ante RIR	Output gap	Year	Ex ante RIR	Output gap
Argentina	1925	6.26	100.55	1955	-10.83	100.06
	1934	0.03	99.70	2001	-0.96	99.86
Australia	1935	3.02	99.63	1954	1.50	99.91
	1938	1.12	100.00	2007	2.46	100.04
Canada				1955	-0.13	100.07
				1997	2.41	99.98
Denmark	1887	5.38	100.00	1954	-0.23	100.05
	1927	1.74	100.09	1996	3.76	99.91
Finland	1889	4.45	99.95	1954	1.80	100.16
	1934	2.09	100.50	1987	2.61	100.00
France	1901	-0.99	100.03	1954	-1.13	100.37
	1927	-3.59	100.75	2008	-0.25	100.07
Germany	1897	3.01	100.00	1954	2.05	99.71
	1934	2.71	99.76	1993	3.43	100.14
Japan	1923	4.93	99.96			
	1935	2.33	100.18			
Netherlands	1934	3.21	100.07	1951	-3.11	100.18
	1938	1.40	100.98	1997	2.82	100.08
New Zealand	1930	7.89	99.90	1949	-0.86	99.97
	1939	-0.06	100.81	1989	2.78	100.07
Sweden	1885	4.93	100.09			
	1926	3.74	100.08			
United Kingdom	1883	4.96	100.04	1961	2.24	100.01
	1927	3.98	99.99	1994	3.98	99.62
United States	1937	0.52	99.48	1963	0.51	99.80
	1941	-1.57	100.23	1997	1.25	100.04

Note: RIR= ex ante real interest rate. Japan and Sweden's ex ante real interest rate does not follow a clear trend during the postwar period; therefore, their series were not detredend. Data on the short-term interest rate of Canada is only available from 1935. Given that the estimation of the ex ante real interest rate uses four lags, no information is available for the period prior to WWII.

Table A2. Country regressions for estimating the monetary policy rule in Romer and Romer's (2002) procedure

Country	Constant	Inflation	Output gap	Lagged int
Argentina	-366.68	0.89	3.56	0.29
	(0.477)	(0.001)	(0.488)	(0.212)
Australia	48.03	0.13	-0.48	0.69
	(0.799)	(0.234)	(0.799)	(0.000)
Canada	-26.87	0.15	0.26	0.71
	(0.795)	(0.197)	(0.797)	(0.000)
Denmark	121.58	0.05	-1.22	0.83
	(0.154)	(0.632)	(0.152)	(0.000)
Finland	80.48	0.14	-0.81	0.55
	(0.308)	(0.284)	(0.304)	(0.001)
France	21.00	0.05	-0.21	0.69
	(0.864)	(0.687)	(0.866)	(0.003)
Germany	69.51	0.07	-0.71	0.58
	(0.152)	(0.509)	(0.146)	(0.001)
Japan	172.93	0.50	-1.73	0.60
	(0.056)	(0.051)	(0.056)	(0.000)
Netherlands	50.91	0.11	-0.51	0.94
	(0.184)	(0.304)	(0.182)	(0.000)
New Zealand	-32.43	0.04	0.32	0.82
	(0.758)	(0.584)	(0.758)	(0.000)
Sweden	319.93	-0.0	-3.20	0.75
	(0.000)	(0.667)	(0.000)	(0.000)
United Kingdom	-17.79	0.07	0.17	0.86
	(0.785)	(0.295)	(0.792)	(0.000)
United States	26.95	0.19	-0.27	0.74
	(0.714)	(0.012)	(0.708)	(0.000)

Note: OLS regressions. The estimated ex ante real interest rate is the dependent variable. P-values are shown in parenthesis.

Table A3. Regressions for estimating the monetary policy rule in Taylor's (1998) procedure

Country	Constant	Inflation	Output gap
Argentina	-657.98	2.05	6.52
	(0.033)	(0.000)	(0.033)
Australia	107.50	1.11	-1.03
	(0.702)	(0.000)	(0.711)
Brazil	-938.48	-0.19	9.58
	(0.008)	(0.003)	(0.007)
Canada	-162.71	1.23	1.65
	(0.326)	(0.000)	(0.318)
Denmark	231.66	0.70	-2.28
	(0.042)	(0.000)	(0.045)
Finland	121.46	0.73	-1.18
	(0.053)	(0.000)	(0.06)
France	295.24	0.91	-2.92
	(0.021)	(0.000)	(0.022)
Germany	-2.28	0.85	0.04
	(0.972)	(0.000)	(0.95)
Japan	153.35	1.12	-1.52
	(0.000)	(0.000)	(0.000)
Netherlands	170.08	0.93	-1.67
	(0.023)	(0.000)	(0.025)
New Zealand	-111.91	0.93	1.16
	(0.527)	(0.000)	(0.509)
Sweden	124.16	0.79	-1.21
	(0.32)	(0.000)	(0.329)
United Kingdom	-148.63	0.99	1.52
	(0.314)	(0.000)	(0.303)
United States	-33.57	1.13	0.34
	(0.845)	(0.000)	(0.839)

Note: OLS regressions. The nominal interest rate is the dependent variable. P-values are shown in parenthesis.

Table A4. Correlation between monetary policy indicators and stock prices across monetary periods, 1875-2010

	stock							
	interest rate							
		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
int	-4.1845***	-6.5911*	-5.9411***	10.6921**	-0.2330	-6.8638***	-5.7711***	-1.3903
	(1.0953)	(3.5579)	(2.1552)	(4.8547)	(2.6478)	(2.0005)	(1.9806)	(1.1612)
lag1.int	-1.6789*	1.5757	0.7007	19.1190***	-7.4820**	0.5081	4.8770**	-1.0795
	(0.9961)	(4.0598)	(3.6402)	(5.0090)	(3.1036)	(2.0737)	(1.9983)	(1.1126)
lag2.int	-1.0070	-3.9179	2.2946	14.0438***	12.7825***	6.7300***	3.6621**	-1.4158
	(1.0129)	(3.5736)	(3.8128)	(2.7215)	(2.8647)	(2.1394)	(1.6523)	(1.0019)
gdp_gr	0.3612	1.5109***	0.7218	0.6886	0.0004	0.6778	2.6913**	0.1551
	(0.3070)	(0.5234)	(0.4896)	(0.7244)	(0.3980)	(0.6127)	(1.2198)	(0.6027)
inf	-0.2498	-0.8119***	0.9545**	-1.3935**	1.1934***	-1.8389**	1.0842	0.4015
	(0.2507)	(0.2255)	(0.3912)	(0.5399)	(0.3405)	(0.7464)	(0.9402)	(1.2466)
Obs	99	33	39	67	118	138	78	331
Countries	4	7	10	12	13	13	13	12

	Deviations from the monetary policy rule							
		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
dev_tay	-2.8037***	0.3621	-3.780***	2.5209	1.5521*	-1.5457	-0.8546**	-2.8165***
	(1.0489)	(0.8821)	(1.3438)	(2.5244)	(0.8054)	(1.4299)	(0.4218)	(1.0972)
lag1.dev_tay	0.1447	-0.1559*	-0.3359	3.6198***	1.5427***	-0.4739	-2.2732***	-2.0773**
	(0.3226)	(0.0932)	(0.3076)	(0.7088)	(0.3308)	(0.9978)	(0.3151)	(0.9990)
lag2.dev_tay	-0.1881	0.3572***	-1.1356***	2.3562***	0.2517	0.2805	2.0314***	-1.1494
	(0.2809)	(0.1106)	(0.3043)	(0.6498)	(0.3362)	(0.9863)	(0.3428)	(0.9896)
gdp_gr	0.5391	1.7151***	1.1356	0.3081	0.0395	0.3072	0.9557	0.4836
	(0.3380)	(0.2038)	(0.4444)	(0.8461)	(0.3434)	(0.6629)	(0.6386)	(0.5589)
inf	-2.9733***	-0.9411	-2.8037	-0.0848	2.1617***	-3.1850***	-1.3697**	-2.3162*
	(1.0889)	(0.7998)	(1.1945)	(2.3988)	(0.7308)	(1.0751)	(0.5652)	(1.2045)
Obs	98	32	38	67	118	138	78	331
Countries	4	7	10	12	13	13	13	12

Notes: First differenced GLS estimations allowing individual specific AR(1) process and heteroskedasticity in the error terms. Robust standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* refers to the first lag of variable x. All variables are first differences. Dependent variable is *stock*.

Table A5. Correlation between monetary policy indicators and nominal wage across monetary periods, 1875-2010

nw_gr

Interest rate

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
int	-1.4260**	5.0580***	1.9514***	-0.5498	1.0469**	0.7029***	0.2865	0.2490***
	(0.5650)	(1.8049)	(0.2487)	(0.7485)	(0.4626)	(0.2053)	(0.2751)	(0.0568)
lag1.int	-0.2372	-2.0202	0.0180	-0.3651	-0.3823	-0.0882	0.1207	0.0884*
	(0.4420)	(2.3410)	(0.4893)	(0.7868)	(0.6034)	(0.2205)	(0.3244)	(0.0535)
lag2.int	-0.4297	-4.9611***	0.9134***	-0.3395	-0.6521	0.1994	0.1916	-0.0329
	(0.4646)	(1.7495)	(0.3463)	(0.5122)	(0.5455)	(0.2158)	(0.3464)	(0.0501)
lag1.inf	-0.3402***	0.1742	-0.5660***	-0.4639***	-0.0005	-0.2070*	0.0106	0.1149**
	(0.1198)	(0.1277)	(0.0834)	(0.0536)	(0.0786)	(0.1007)	(0.1648)	(0.0542)
lag1.com_inf	-0.1103**	0.1598**	0.0117	0.0072	0.0896***	-0.0150	0.0446	-0.0037
	(0.0443)	(0.0652	(0.0137)	(0.0071)	(0.0173)	(0.0298)	(0.0423)	(0.0039)
unemp	-0.0092			0.0399	0.1727	0.2543*	-0.2672	-0.0015
	(0.3077)			(0.0769)	(0.1278)	(0.1510)	(0.6966)	(0.0971)
gdp_gap	8.8152***	3.0162	8.5743***	3.4784***	-2.3063*	5.7633***	-2.1499	0.8959**
	(1.8978)	(3.3508)	(1.2375)	(1.0381)	(1.2495)	(1.2275)	(4.1112)	(0.4446)
Obs	81	38	43	49	83	112	74	331
Countries	4	8	11	9	9	11	13	12

Deviations from monetary policy rule

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
dev_tay	-0.7255***	-0.8794***	-0.3043***	-0.7945***	-0.8768***	-0.5064***	-0.3923***	-0.1094**
	(0.1137)	(0.0703)	(0.0787)	(0.1190)	(0.110)	(0.0975)	(0.0315)	(0.0509)
lag1.dev_tay	-0.0235	-0.3092	-0.1518	-0.3449	0.1033	-0.6387***	0.4207***	0.1724***
	(0.2991)	(0.2366)	(0.1631)	(0.5671)	(0.2332)	(0.1491)	(0.0575)	(0.0529)
lag2.dev_tay	-0.0836	-0.0838	-0.2320*	0.00913	0.0210	0.1825*	-0.0539**	0.0472
	(0.1094)	(0.0548)	(0.1249)	(0.0842)	(0.0749)	(0.0985)	(0.0255)	(0.0478)
lag1.inf	-0.0345	0.0909	-0.4607***	-0.5578	0.1169	-0.7349***	0.6251***	0.2928***
	(0.3051)	(0.2397)	(0.1678)	(0.5680)	(0.2226)	(0.1385)	(0.1055)	(0.0550)
lag1.com_inf	-0.0721*	0.0951***	0.0567**	-0.0303***	-0.0077	0.0432	0.0080	-0.0004
	(0.0389)	(0.0332)	(0.0243)	(0.0103)	(0.0181)	(0.0355)	(0.0153)	(0.0041)
unemp	0.4357			-0.0759	0.1409	0.1928	-0.9529***	-0.1027
	(0.2756)			(0.1323)	(0.1178)	(0.1340)	(0.3354)	(0.0886)
gdp_gap	7.6941***	-0.6988	4.5166***	1.4574	-1.9055*	6.0599***	3.8428**	1.5258***
	(1.7507)	(2.1982)	(1.0467)	(1.4549)	(1.1245)	(1.1286)	(1.7623)	(0.4323)
Obs	80	37	42	49	83	112	74	331
Countries	4	8	11	9	9	11	13	12

Notes: First differenced GLS estimations allowing individual specific AR(1) process and heteroskedasticity in the error terms. Robust standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* refers to the first lag of variable x. All variables are first differences. Dependent variable is *nw_gr*.

Table A6. Correlation between monetary policy indicators and unemployment across monetary periods, 1875-2010

unemp

Interest rate

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	**General Float**	**Gold Standard**	**Managed Float**	**Preconvertibility**	**Convertibility**	**Agressive MP**	**Moderate MP**
int	-0.1113			-0.4561	0.0723	-0.0750	-0.0532*	-0.1348***
	(0.1215)			(0.6743)	(0.1028)	(0.0737)	(0.0286)	(0.0209)
lag1.int	0.0796			-0.0806	0.1200	0.0707	0.0400	0.0006
	(0.1312)			(0.7089)	(0.1362)	(0.0719)	(0.0267)	(0.0219)
lag2.int	0.0505			0.7322***	0.0936	0.0860	0.0298	0.0253
	(0.1067)			(0.2339)	(0.1433)	(0.0906)	(0.0237)	(0.0197)
lag1.inf	0.0146			-0.2535***	0.0223	0.0276	0.0061	0.0001
	(0.0230)			(0.0524)	(0.0181)	(0.0374)	(0.0061)	(0.0195)
gdp_gap	-4.2501***			-6.3865***	-0.5317	-1.4780***	-1.2360***	-1.7655***
	(0.9558)			(1.1906)	(0.5658)	(0.4524)	(0.4562)	(0.1957)
gdp_pc	0.1077*			0.1802***	-0.0876**	-0.0506*	-0.0002	-0.0466***
	(0.0589)			(0.0619)	(0.0424)	(0.0303)	(0.0282)	(0.0140)
rw_gr	0.0895***			0.2614***	0.0645***	-0.0081	-0.0162*	0.0080
	(0.0288)			(0.0563)	(0.0240)	(0.0233)	(0.0087)	(0.0126)
Obs	81			49	83	112	74	331
Countries	4			9	9	11	13	12

Deviations from monetary policy rule

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	**General Float**	**Gold Standard**	**Managed Float**	**Preconvertibility**	**Convertibility**	**Agressive MP**	**Moderate MP**
dev_tay	0.0222			0.2182***	0.0651***	-0.0325	0.0018	-0.0420**
	(0.0291)			(0.0500)	(0.0201)	(0.0391)	(0.0030)	(0.0207)
lag1.dev_tay	0.2271**			-1.6411***	0.0801	0.1710***	0.0172	-0.0183
	(0.1025)			(0.2315)	(0.0630)	(0.0305)	(0.0130)	(0.0253)
lag2.dev_tay	0.0204			0.0671	-0.0074	0.0039	0.0064**	0.0004
	(0.0274)			(0.0496)	(0.0136)	(0.0423)	(0.0027)	(0.0199)
lag1.inf	0.2226*			-2.06088***	0.0912	0.1740***	0.0389	-0.0053
	(0.1149)			(0.2608)	(0.0681)	(0.0437)	(0.0242)	(0.0260)
gdp_gap	-4.8899***			-4.1370***	-1.0560**	-1.8882***	-1.3473***	-2.0353***
	(0.8681)			(1.1706)	(0.4656)	(0.4926)	(0.4362)	(0.2075)
gdp_pc	0.1486***			0.0609	-0.0851***	-0.0636**	0.0042	-0.0530***
	(0.0550)			(0.0624)	(0.0320)	(0.0292)	(0.0289)	(0.0151)
rw_gr	0.0871***			0.2321***	0.0616***	0.0427**	-0.0036	0.0116
	(0.0299)			(0.0666)	(0.0182)	(0.0197)	(0.0111)	(0.0143)
Obs	80			49	83	112	74	331
Countries	4			9	9	11	13	12

Notes: First differenced GLS estimations allowing individual specific AR(1) process and heteroskedasticity in the error terms. Robust standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* refers to the first lag of variable x. All variables are first differences. Dependent variable is *unemp*.

Table A7. Correlation between monetary policy indicators and inflation across monetary periods, 1875-2010

inf

Interest rate

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
int	-0.1512	-1.7194	1.6305***	-1.4156**	1.3207***	0.2165	0.9983***	0.2831***
	(0.3542)	(1.5380)	(0.4395)	(0.5476)	(0.4442)	(0.2030)	(0.2119)	(0.0482)
lag1.int	-0.1933	-3.3599***	-0.6419	0.4447	-0.5187	0.2878	-0.0610	0.1332***
	(0.3023)	(1.1859)	(0.6739)	(0.5139)	(0.4890)	(0.2084)	(0.2762)	(0.0449)
lag2.int	-0.4270	-4.4368***	1.0858*	0.0500	-1.3482**	-0.2696	0.0152	-0.0239
	(0.3312)	(1.0695)	(0.6152)	(0.2504)	(0.5261)	(0.2267)	(0.2366)	(0.0438)
gdp_gap	0.7758	13.5119***	3.9082***	2.2209***	-2.4448*	0.2415	-2.4687	0.8143***
	(0.9494)	(2.9309)	(1.2251)	(0.7810)	(1.2865)	(0.9108)	(3.4902)	(0.3088)
com_inf	-0.0187	-0.2596***	0.1277***	-0.0021	0.0421**	0.0157	-0.0619	0.0143***
	(0.0277)	(0.0514)	(0.0322)	(0.0064)	(0.0194)	(0.0266)	(0.0390)	(0.0038)
Obs	196	38	43	73	124	138	78	331
Countries	6	8	11	13	13	13	13	12

Deviations from monetary policy rule

		Interwar			Bretton Woods		Floating Regime	
	Gold Standard	General Float	Gold Standard	Managed Float	Preconvertibility	Convertibility	Agressive MP	Moderate MP
dev_tay	-1.1662***	-0.9607***	-0.7166***	-0.7705***	-1.0623***	-0.8587***	-0.5052***	-0.4900***
	(0.0199)	(0.0492)	(0.0738)	(0.0194)	(0.0161)	(0.0481)	(0.0100)	(0.0373)
lag1.dev_tay	-0.0550***	-0.0285	0.0166	-0.0005	0.0493***	0.0178	-0.0022	0.0812**
	(0.0209)	(0.0330)	(0.0514)	(0.0236)	(0.0156)	(0.0601)	(0.0088)	(0.0362)
lag2.dev_tay	-0.0401**	0.0040	-0.1039**	0.0681***	0.0179	0.0757	-0.0109	0.0202
	(0.0195)	(0.0361)	(0.0473)	(0.0192)	(0.0136)	(0.0524)	(0.0097)	(0.0360)
gdp_gap	2.1769***	5.5900***	0.5680	1.0292***	0.1144	0.7180*	2.9267***	2.6422***
	(0.2565)	(1.4079)	(0.3798)	(0.3053)	(0.3826)	(0.4328)	(0.9454)	(0.2627)
com_inf	-0.0051	-0.0311*	0.0326***	-0.0001	-0.0199***	-0.0093	-0.0285**	-0.0009
	(0.0064)	(0.0176)	(0.0118)	(0.0026)	(0.0051)	(0.0125)	(0.0115)	(0.0027)
Obs	194	37	42	73	124	138	78	331
Countries	6	8	11	13	13	13	13	12

Notes: First differenced GLS estimations allowing individual specific AR(1) process and heteroskedasticity in the error terms. Robust standard errors are shown in parenthesis. *, **, *** show statistical significance at the 10%, 5%, and 1% level, respectively. *lag1.x* refers to the first lag of variable x. All variables are first differences. Dependent variable is *inf*.

Data Appendix

Capital share

The capital share was taken from the Bengtsson-Waldenström Capital Shares Database. The capital share is the ratio of the sum of capital incomes (interest, profits, dividends, and realized capital gains) to valued added. Bengtsson and Waldenström (2015) provide the various approaches used to estimate the capital share in each country: 100-wage share, capital share in national income (when the data is derived from national accounts), capital share in national factor-price income, surplus in domestic product, and adjusted series (when they adjusted the wage share for the imputed labor income of self-employed). I follow Bengtsson and Waldenström (2015) in the selection of indicators for each country.

- Argentina
  - 1913-2000: 100-wage share
- Australia
  - 1927-1959: 100-wage share
  - 1960-2010: capital share in national income
- Brazil
  - 1920-2000: 100-wage share
- Canada
  - 1926-1959: adjusted series
  - 1960-2010: capital share in national income
- Denmark
  - 1876-2007: 100-wage share
- Finland
  - 1875-1899: 100-wage share
  - 1900-2010: capital share in national income
- France
  - 1896-2010: capital share in price-factor national income
- Germany
  - 1875-2010: capital share in price-factor national income
- Japan
  - 1906-1955: 100-wage share
  - 1956-2010: capital share in price-factor national income
- Netherlands
  - 1921-2010: surplus in domestic production
- New Zealand
  - 1922-1967: surplus in domestic production
  - 1986-2010: 100-wage share
- Sweden
  - 1875-2010: surplus in domestic production
- United Kingdom
  - 1875-2010: capital share in national income
- United States
  - 1929-2010: capital share in price-factor national income

Short-term nominal interest rates

Data was taken from Global Financial Data (GFD).

- Argentina
    - 1913-2009: Argentina Reserve Bank Discount Rate
- Australia
    - 1926-2010: Australia Reserve Bank Overnight Cash Rate
- Brazil
    - 1948-2010: Brazil Deposit Rate Over SELIC
- Canada
    - 1935-2010: Bank of Canada Discount Rate
- Denmark
    - 1876-2010: Denmark National Bank Discount Rate
- Finland
    - 1875-2010: Finland Central Bank Discount Rate
- France
    - 1896-1991: Bank of France Discount Rate
    - 1994-2010: Euribor, 3 months
- Germany
    - 1875-2005: Germany Berlin Bundesbank Discount Rate
    - 2006-2010: Euribor, 3 months
- Japan
    - 1906-2010: Bank of Japan Discount Rate
- Netherlands
    - 1921-1993: Netherlands Bank Discount Rate on Bills of Exchange
    - 1994-2010: Euribor, 3 months
- New Zealand
    - 1923-2010: New Zealand Reserve Bank Official Cash Rate
- Sweden
    - 1875-2010: Sweden Riksbank Reference Rate
- United Kingdom
    - 1875-2010: Bank of England Base Lending Rate
- United States
    - 1929-2003: Federal Reserve Bank Discount Rate
    - 2004-2010: Federal Funds Official Target Rate

Short-term real interest rates

It refers to the ex-post real interest rate calculated as the difference between the short-term nominal interest rate and the inflation rate.

Trade openness

The indicator was calculated as the ratio of the sum of exports and imports to current GDP. Data on exports and imports of goods taken from GFD was used prior to 1970. For the period 1970-2010 I used exports and imports of goods and services from the United Nations' National Accounts Main Aggregates Database.

Current account balance

The current account balance was calculated as the difference between domestic savings and domestic investment. Prior to 1960 I used data from Taylor (1996), and for the period 1960-2010 savings and investment data was taken from the World Bank World Development Indicators database. Taylor's (1996) paper does not consider Brazil, Finland, Netherlands, and New Zealand. Thus, I use the balance of payments goods surplus/deficit for these countries instead taken from GFD, except for New Zealand for the period 1922-1931 which was taken from the New Zealand Official Yearbook.

Industry share on value added

It is the ratio of the value added of mining, manufacturing, utilities, and construction to total value added. The data was taken from the United Nations' National Accounts Main Aggregates Database.

Railways

The ratio of the railways geographical/route lengths of line to the country area was calculated with data taken from the Cross-country Historical Adoption of Technology dataset.

Telephone lines per capita

The indicator is calculated as 100 times the ratio of the number of mainland telephone lines connecting a customer's equipment to the public switched telephone networks to the population. The data is taken from the Cross-country Historical Adoption of Technology dataset.

Unemployment rate

Data was taken from GFD, except in the case of the United Kingdom, which was taken from Hills, Thomas, and Dimsdale (2010). The following are the periods in which the data was available:

- Argentina: 1974-2010
- Australia: 1926-2010
- Brazil: 1976-2010
- Canada: 1926-2010
- Denmark: 1910-2010
- Finland: 1958-2010
- France: 1896-1913 and 1968-2010
- Germany: 1887-2010
- Japan: 1906-2010
- Netherlands: 1921-2010
- New Zealand: 1970-2010
- Sweden: 1919-2010:
- United Kingdom: 1875-2010
- United States: 1929-2010

Real Wages

The real wage series combine mostly Williamson's (1995) national real wage indices and the OECD hourly earnings index in manufacturing and for the private economic sector series. The OECD series were deflated using the CPI in order to obtain real wages. Williamson's series cover the period 1830-1988 for Argentina, Australia, Canada, United States, Denmark, France, Germany, Great Britain, Netherlands, Sweden, and Brazil. The OECD series covers the period 1955-2010 for Australia, Canada, Denmark, Finland, France, Germany, Japan, Netherlands, New Zealand, Sweden, United Kingdom, and United States. I linked both series and then calculated an index with base year 2010. What follows is the list of the sources used for each country.

- Argentina
    - 1913-1988: Williamson (1995)
    - 1989-1999: Graña and Kennedy (2008)
    - 2000-2010: ECLAC
- Australia
    - 1926-1983: Williamson (1995)
    - 1984-2010: OECD
- Brazil
    - 1919-1988: Williamson (1995)
    - 1989-1997: Bértola, Calicchio, Camou, and Porcile (2012)
    - 1998-1999: Green, Dickerson, and Saba Arbache (2000)[24]
    - 2000-2010: ECLAC
- Canada
    - 1925-1955: Williamson (1995)
    - 1956-2010: OECD
- Denmark
    - 1875-1971: Abildgren (2010)
    - 1972-2010: OECD
- Finland
    - 1875-1913: Heikkinen
    - 1914-1955: Statistics Finland[25]
    - 1956-2010: OECD
- France
    - 1895-1956: Williamson (1995)
    - 1957-2010: OECD
- Germany
    - 1875-1957: Williamson (1995)
    - 1919-1922 and 1994: Bry (1960)
    - 1958-2010: OECD
- Japan

[24] Green, Dickerson, and Saba Arbache present the real mean wage at 1998 prices by education level between 1981 and 1999, based on the Pesquisa Nacional por Amostras de Domicilio, a nationally representative household survey. The series used in this paper corresponds to the average of the six education levels.

[25] Using the capital share, it is easy to derive the labor share (100 – capital share) and estimate the total earnings of the labor force at current prices. The average wage is defined as the ratio of total earnings to the number of employed people. This average nominal wage is then deflated with the CPI in order to estimate the average real wage.

- 1905-1955: Statistics Bureau Japan
- 1956-2010: OECD

- Netherlands
  - 1920-1970: Williamson (1995)
  - 1971-2010: OECD
- New Zealand
  - 1921-1989: New Zealand Official Yearbook[26]
  - 1990-2010: OECD
- Sweden
  - 1875-1971: Williamson (1995)
  - 1972-2010: OECD
- United Kingdom
  - 1875-1963: Williamson (1995)
  - 1964-2010: OECD
- United States
  - 1928-1955: Williamson (1995)
  - 1956-2010: OECD

Nominal wages

Once a comparable cross-country series was constructed, I multiplied the each year's index by the corresponding CPI in order to obtain nominal wages. Since I was interested in the evolution of nominal wages, the variable used in all estimations is the rate of variation of nominal wages.

Inflation

Inflation is calculated as the rate of variation of the consumer price index taken from GFD.

Commodity price index

I use the rate of variation of each commodity price index, which raw series were taken from GFD. Between 1875 and 1913 I use the Warren and Pearson Commodity Price Index and for the period 1919-2010 I used the Thompson Reuters Core Commodity Equal Weighted Index.

Stock prices

Data of stock prices indexes was taken from GFD. For normalization purposes, I use the rate of variation of each index as a measure of the evolution of stock prices.

- Argentina
  - 1938-2058: Swan, Culbertson and Fritz Index;
  - 1966-2010: Buenos Aires SE General Index (IVBNG)
- Australia
  - 1927-2010 is Australia ASX All-Ordinaries
- Brazil
  - 1955-2000: Rio de Janeiro Bolsa de Valores Index (IBV)

[26] I used various editions of the New Zealand Official Yearbook to link a series of nominal weekly wage-rates index numbers for all industrial groups between 1921 and 1989, which was then deflated with the CPI.

  - 2001-2010: Rio de Janeiro IBX-100 Index
- Canada
  - 1926-2010: Canada S&P/TSX 300 Composite
- Denmark
  - 1914-2010: OMX Copenhagen All-Share Price Index
- Finland
  - 1912-2010: OMX Helsinki All-Share Price Index
- France
  - 1896-1993: France INSEE General Index
  - 1994-2010: France SBF-120 Index
- Germany
  - 1870-2010: Germany CDAX Composite Index
- Japan
  - 1914-2010: Tokyo SE Price Index (TOPIX)
- Netherlands
  - 1921-2010: Netherlands All-Share Price Index
- New Zealand
  - 1926-2010: New Zealand SE All-Share Capital Index
- Sweden
  - 1901-2010: Sweden OMX Affärsvärldens General Index
- United Kingdom
  - 1855-2010: UK FTSE All-Share Index
- United States
  - 1929-2010: S&P 500 Composite Price Index

Real GDP

Real GDP in 1990 International Geary-Khamis million dollars prior to 1950 was taken from Maddison's Historical Statistics of the World Economy. For the period 1950-2010 I used real GDP chained PPPs in 2005 million dollars from Penn World Table 8.1. I constructed a new series by linking both series with base year 2005.

Real GDP per capita

I use the rate of variation of real GDP per capita. Prior to 2009 it refers to real GDP per capita in 1990 International Geary-Khamis dollars taken from Maddison's Historical Statistics of the World Economy. For years 2009 and 2010 is corresponds to GDP per capita in constant 2011 international PPP dollars taken from the World Bank World Development Indicators.

Output gap

Calculated as the ratio of actual real GDP to its long-run trend estimated with a Hodrick-Prescott filter and multiplied by 100.

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