International Review of Applied Economics

ISSN: 0269-2171 (Print) 1465-3486 (Online) Journal homepage: http://www.tandfonline.com/loi/cira20

Globalization and the effects of changes in functional income distribution on aggregate demand in Germany

Engelbert Stockhammer , Eckhard Hein & Lucas Grafl

To cite this article: Engelbert Stockhammer , Eckhard Hein & Lucas Grafl (2011) Globalization and the effects of changes in functional income distribution on aggregate demand in Germany, International Review of Applied Economics, 25:1, 1-23, DOI: 10.1080/02692170903426096

To link to this article: https://doi.org/10.1080/02692170903426096

Published online: 08 Dec 2010.

International Review of Applied Economics
Vol. 25, No. 1, January 2011, 1–23

Routledge
Taylor & Francis Group

Globalization and the effects of changes in functional income distribution on aggregate demand in Germany

Engelbert Stockhammer[a,*], Eckhard Hein[b] and Lucas Grafl[c]

[a]*Kingston University, London, UK;* [b]*Berlin School of Economics and Law, Berlin, Germany;* [c]*Wirtschaftsuniversität Wien, Vienna, Austria*

Germany has experienced a period of extreme nominal and real wage moderation since the mid-1990s. Contrary to the expectations of liberal economists, this has failed to improve Germany's mediocre economic performance. However, Germany is now running substantial current account surpluses. One possible explanation for Germany's disappointing performance is found in Kaleckian theory, which highlights that the domestic demand effect of a decline in the wage share will typically be contractionary, whereas net exports will increase (Blecker 1989). The size of the foreign demand effect will critically depend on the degree of openness of the economy. This paper aims at estimating empirically the demand side of a Bhaduri and Marglin (1990) type model for Germany. The paper builds on the estimation strategy of Stockhammer, Onaran, and Ederer (2009) and Hein and Vogel (2008, 2009). The main contribution lies in a careful analysis of the effects of globalization. Since Germany is a large open economy by now it is a particularly interesting case study.

Keywords: distribution; demand; investment; consumption; foreign trade; macroeconomics; Keynesian economics; Germany; globalization

JEL Classifications: E12, E20, E22, E25, E61

1. Introduction

This paper investigates how increasing globalization has affected the demand effects of changes in the functional distribution of income. The motivation of this analysis is that, in the empirical post-Keynesian literature, a consensus seems to have emerged that the domestic sector in most economies is wage-led (Naastepad and Storm 2006–07; Stockhammer, Onaran and Ederer 2009; Hein and Vogel 2008, 2009). However, the foreign component of demand may turn a wage-led demand regime into a profit-led one. Globalization may have brought to an end the wage-led demand regimes of the relatively closed economies in the post-war era.

While the important role of international trade was recognized early on in the development of post-Kaleckian models[1] (Blecker 1989, 1999; Bhaduri and Marglin 1990), empirical studies have remained rudimentary in their analysis of international trade. Bowles and Boyer (1995) estimated the net export share as a function of the wage share for several countries. Hein and Vogel (2008, 2009) use the same approach for different countries and time periods. Naastepad and Storm (2006–07) find very small trade

* Corresponding author. Email: engelbert.stockhammer@wu-wien.ac.at

ISSN 0269-2171 print/ISSN 1465-3486 online

DOI: 10.1080/02692170903426096
http://www.informaworld.com

effects (compared to consumption and investment effects). Hein and Vogel (2008) fail to find any (statistically significant) effect for most countries. However, their method implies that they are not allowing for any effects of globalization.

The effect of globalization on demand regimes will be investigated for Germany by estimating the demand side of a Bhaduri and Marglin (1990) type model empirically. Germany is Europe's largest economy, but it is also a rather open economy. Its export share in GDP rose from 16% in 1970 to 47% in 2007.[2] It has also experienced a period of extreme wage moderation since the mid-1990s (Hein, Schulten and Truger 2006) and is therefore a particularly interesting case study.

Globalization is here (as elsewhere) defined by the increase in international trade and capital flows. It has had several effects on how changes in functional income distribution affect aggregate demand. First, imports and exports have grown much faster than GDP. With given price elasticities, this means that absolute effects of a nominal wage change will increase. Second, a substantial part of international trade is in intermediate rather than final goods; this trend is often referred to as outsourcing, and export effects have to be adjusted for it. Third, as imports and exports have increased, so have competitive pressures, which presumably have also led to changes in price formation. Similarly, price elasticities for imports and exports may have changed. Fourth, capital mobility has increased. While this is very clear for financial capital flows, its effects on physical capital stocks – that is, investment – are less clear.

The paper is structured as follows. Section 2 briefly discusses Germany's macroeconomic performance. Section 3 presents the theoretical background and the post-Kaleckian model upon which the empirical estimations are based. Section 4 summarizes the empirical literature on these models. Section 5 presents the econometric results for the effect of changes in functional income distribution on private consumption, private investment and net exports. Section 6 summarizes the key findings and discusses policy conclusions.

2. Germany's macroeconomic performance

Germany is often considered to have coped comparatively successfully with the macroeconomic shocks of the 1970s. During the 1980s, the German economy experienced stable growth, although at rates no higher than those of the overall Euro area, as well as lower unemployment rates by international standards (Hein and Truger 2005). However, after the unification boom and the following recession in the early 1990s, the German economy did not manage to recover to its previous strength. During the convergence process towards the European Monetary Union (EMU) since the mid-1990s and, in particular, after the Euro was introduced in 1999, Germany's GDP growth fell below that of the overall Euro area and unemployment rates increased to the Euro area average. After a short upswing at the end of the 1990s, Germany's economy was hit particularly hard by the 2000–2001 recession. This was followed by a period of stagnation until 2005, with weak domestic demand but rising export surpluses (Hein and Truger 2007, 2009). Only the years 2006 and 2007 saw a recovery, with GDP growth roughly at the Euro area average accompanied by a considerable decline in unemployment which, however, was terminated by the worldwide slowdown and the financial crisis in 2008. But even in this upswing, the growth rate of private consumption demand remained weak by historical and international standards.

The German low-growth decade from 1996–2005 was characterized by extremely moderate German wage development (Hein, Schulten, and Truger 2006). Nominal unit labour cost growth remained below the Euro area average for the whole decade.[3] In 2004 and 2005, it was even negative, exerting deflationary pressure on the economy (Hein and Truger 2007). But nominal wage moderation did not only affect prices and inflation; it also had an impact on functional income distribution. The labour income share, which, like in many other OECD countries, had shown a downward trend since the early 1980s, continued to fall, in particular after the 2000/01 recession. From 2000 to 2005, the labour income share in GDP decreased by three percentage points, a decline which is quite unusual for a recession and a subsequent stagnation (Hein and Truger 2009).

3. Distribution-led demand regimes and globalization

This section will present the macroeconomic model that forms the basis for the empirical analysis of the effects of changes in functional income distribution on aggregate demand. The model allows for wage-led as well as profit-led demand regimes and is similar in spirit to Bhaduri and Marglin (1990) model. Aggregate demand (Y) is the sum of consumption (C), investment (I), net exports (NX) and government expenditure (G). All variables are in real terms. In a general formulation, consumption, investment and net exports are written as functions of income (Y), the wage share (Ω)[4] and some other control variables (summarized as z). The latter are assumed to be independent of output and distribution. Government expenditures are considered to be a function of output only. Aggregate demand then is:

$$Y = C(Y,\Omega) + I(Y,\Omega,z_I) + NX(Y,P,z_{NX}) + G(Y,z_G) \tag{1}$$

and the price level, P, is:

$$P = f(\Omega, z_P) \tag{2}$$

This model is rather general in that it can be reduced to a standard Keynesian short-run model (e.g. Blanchard 2006) if $\partial C/\partial\Omega$ and $\partial I/\partial\Omega$ are assumed to be zero.

The inclusion of income distribution shall briefly be motivated. In the consumption function, the basic assertion is that wage incomes and profit incomes are associated with different propensities to consume. The Kaleckian assumption is that the marginal propensity to save is higher for capital income than for wage income; consumption is therefore expected to increase when the wage share rises.

Investment depends on output, the long-term real interest rate, and it is expected to decrease when the wage share rises because future profits may be expected to fall. In classical economics, it was a straightforward assumption that capital accumulation was a positive function of the rate of profit. Today, it is often argued that retained earnings are a privileged source of finance and may thus influence investment expenditures (Stiglitz and Weiss 1981; but already Kalecki 1954).

Net exports are a negative function of domestic demand, a positive function of foreign demand, and will depend negatively on domestic prices. Domestic prices in turn depend on domestic nominal unit labor costs (ULC) and on import prices. It is important to note that this structure implies that net exports depend (among other things) on (changes in) the wage share if a change in the latter is associated with a

change in nominal unit labor costs and hence domestic prices. As the price equation indicates the marginal effect of a change in ULC on prices, expressing the relation between real unit labor costs and prices is only a matter of re-parametrization. Real unit labor costs in the data set we use are identical with the wage share.

There are several limitations to the model presented above. First, government expenditures can react to income distribution; however, this is ignored in our analysis, which focuses on the private sector. A serious treatment of the public sector is beyond the scope of this paper. Second, the model only covers the goods market. Typically, the goods market is complemented by a distribution function (Marglin and Bhaduri 1990) that describes the effects of changes in economic activity on income distribution. However, the focus of this paper is on the demand effects, and the wage share (Ω) is taken as exogenous. Thus feedbacks, for example, from growth on income distribution via lower unemployment and a better bargaining position of labor are ignored at this stage. It is therefore a partial model of a basic private open-economy type.

Differentiating Y from equation (1) with respect to Ω and collecting terms gives:

$$\frac{dY^*}{d\Omega} = \frac{h_2}{1-h_1} \tag{3}$$

where $h_1 = \left(\frac{\partial C}{\partial Y} + \frac{\partial I}{\partial Y} + \frac{\partial NX}{\partial Y} + \frac{\partial G}{\partial Y}\right)$ and $h_2 = \left(\frac{\partial C}{\partial \Omega} + \frac{\partial I}{\partial \Omega} + \frac{\partial NX}{\partial P} + \frac{\partial P}{\partial \Omega}\right)$

The term $1/(1-h_1)$ in equation (3) is a standard multiplier and has to be positive for stability. The sign of the total derivative therefore depends on the sign of the numerator. h_2 is the sum of the partial derivatives of the components of demand with respect to income distribution. This sum is *private excess demand*; that is, the change in demand caused by a change in income distribution given a certain level of income. It is impossible to sign h_2 *a priori*, since we hypothesize that $\partial C/\partial\Omega>0$, $\partial I/\partial\Omega<0$ and $\partial NX/\partial\Omega<0$. The sum of these effects can therefore only be determined empirically. Determining the sign of private excess demand is therefore the focus of the empirical estimations in this study. The total effect of the increase in the wage share on aggregate demand depends on the relative size of the reactions of the components of GDP, namely consumption, investment and net exports to changes in income distribution. If it is positive ($\partial Y^*/\partial\Omega>0$), the demand regime is called *wage-led*. If the effect is negative ($\partial Y^*/\partial\Omega<0$), it is called *profit-led.*

The contribution of this paper lies in the careful analysis of the effect of distribution on net exports. Globalization in our context refers to the increase in international trade and the increase in the international division of labor. Four potential effects of globalization will be investigated.

First, the increase in international trade is reflected in a rising trend in export shares and import shares. Therefore, a change in the wage share will have different effects on net exports at the beginning and at the end of our sample, even if the price elasticity of exports (and imports) remains stable. This effect will become visible when converting the elasticities obtained from the regression analysis into partial effects.

Second, globalization comes with an increase in the international division of labor. This not only refers to final goods but also to intermediate goods. An increasing share of inputs in production comes from abroad. In recent discussions, this is frequently

referred to as (international) outsourcing. This is also the case for export goods. Contrary to consumption and investment, export and imports are not value-added magnitudes, but gross production values. Therefore an increase (reduction) in exports will by definition cause an increase (decrease) in imports.

Consequently, a loss in competitiveness will not only have the standard effects on exports and imports via prices, but it will also have a 'perverse' indirect effect on imports (reflected in the middle term in the brackets in equation 4). As exports decrease, so does the import demand associated with the production process of export goods. The total effect of a change in the wage share on net exports is:

$$\frac{d(NX)}{d\Omega} = \left(\frac{\partial X}{\partial P} - \frac{\partial M}{\partial X}\frac{\partial X}{\partial P} - \frac{\partial M}{\partial P} \right) \frac{\partial P}{\partial \Omega} \tag{4}$$

Third, the increase in international trade may affect some behavioral functions in our estimations due to an increase in international competition. This may affect the price elasticities of exports and imports as well as the role of ULC in the price equation. Therefore, the relevant behavioral equations will be estimated for sub-periods to investigate whether a change in the relevant parameters did take place. For consistency, all behavioral functions will be estimated for the same sub-periods.

Fourth, the increase in capital mobility may have increased the profit-sensitivity of investment. While there is ample evidence that financial capital has become internationally mobile, the degree of mobility is less clear for physical capital. Hatzius (2000) reports that investment has become increasingly sensitive to labor costs. This will also be investigated by estimating the investment function for sub-periods.

4. Related literature

The Bhaduri and Marglin (1990) model is a flexible post-Kaleckian macro model. It is widely used in modern post-Keynesian economics and has thus increasingly inspired empirical literature. As this literature has been discussed more extensively by Hein and Vogel (2008), the following survey will focus on the treatment of the foreign sector.

The tests of the Bhaduri–Marglin models can be grouped into two estimation strategies. The first group of papers tries to estimate the full model, that is, a goods market equilibrium relation and a distribution function. Stockhammer and Onaran (2004) estimate a structural VAR model consisting of the variables capital accumulation, capacity utilization, profit share, unemployment rate and labor productivity growth for the USA, the UK and France. The goods market is estimated by a model based on Marglin and Bhaduri (1990). From the empirical investigation, it is concluded that unemployment is determined by the goods market, and that the impact of income distribution on demand and employment is very weak. Onaran and Stockhammer (2005) employ a similar model for Turkey and South Korea and find some indication for wage-led demand regimes in these countries. Rather than net exports, they include exports and imports separately. The advantage of the systems approach is that the interaction between the variables can be incorporated. The disadvantage of the Vector Autoregression (VAR) however, is that it is difficult to identify effects of individual variables.

The second group of papers analyzes the goods market in isolation and estimates consumption, investment and net export equations. This is also the approach pursued in this paper. The first paper along these lines was Bowles and Boyer

(1995). To identify international trade effects, they estimate net exports (in percent of GDP) as a function of the profit share and a demand variable. Hein and Vogel (2008) follow Bowles and Boyer (1995) in their treatment of international trade. This approach implicitly assumes that a one percentage point increase in the wage share has the same effect on net exports (in percentage of GDP) independently of the share of exports (and imports) in GDP. It therefore cannot adequately capture the effects of globalization. Naastepad and Storm (2006–07) estimate a similar model for eight OECD countries. With regard to net exports, they estimate an export function with world trade and relative unit labor costs (all in logarithmic growth rates) and assume that imports grow with GDP. They also do not evaluate the net export effects at different degrees of international trade.

Ederer and Stockhammer (2007) for France and Stockhammer, Onaran, and Ederer (2009) for the Euro area estimate separate price equations and import and export equations, which allows them to trace the effects of changes in distribution through prices to exports and imports. Because of this procedure, increasing import and export shares play a role even with constant import and export elasticities. Thus, one aspect of globalization is taken into account. The present paper builds on this approach but offers a richer treatment of globalization.

While the important role of international trade was recognized early on in the development of post-Kaleckian models (Blecker 1989; Bhaduri and Marglin 1990), most empirical studies have not paid much attention to globalization. This is surprising, given the importance of this issue for an egalitarian Keynesian policy strategy. The existing studies also find very small effects of international trade. In Naastepad and Storm (2006–07), the trade effects are much smaller than the consumption and investment effects. They find that a one percentage point increase of real wage growth in Germany leads to a reduction of net exports by 0.13% of GDP. Hein and Vogel (2008) find no statistically significant effect of the wage share on net exports for Germany (and the majority of countries they investigate). Hein and Vogel (2009), however, using a different time series specification, find an effect of 0.36% of GDP.

The contribution of this paper lies in the treatment of international trade. Globalization has had several effects on how changes in functional income distribution affect aggregate demand. Imports and exports have grown relative to GDP, which presumably has also led to changes in wage formation as imported inputs have gained more prominence. Moreover, price elasticities for imports and exports may have changed. And, because of an increase in outsourcing, the import content of exports goods has increased. Finally, investment expenditures may have become more sensitive to profitability.

5. Empirical results

The model is estimated by means of separate single equations for consumption, investment, exports and imports. We use annual data for the period 1970–2005, all taken from the OECD Economic Outlook database (downloaded in June 2007). C, I, X, M, Y, W and R are real consumption expenditures, investment expenditures, exports, imports, GDP, wages and profits respectively. Wages and profits were deflated with the GDP deflator. Variable definitions can be found in the appendix (Table A.1). All variables are treated as being integrated of degree one. For the estimations difference specifications were applied when no cointegrating relationships were found.[5] This is convenient as the difference specifications are parsimonious

and can thus be applied to sub-periods. As the findings on the consumption function and the investment function do not deviate from the existing literature, the following analysis will focus on foreign trade.

There is a major qualification to the results being reported. Functional income distribution is assumed to be exogenous, which is obviously not the case. Demand will affect functional income distribution in at least two ways. First, the profit share typically varies pro-cyclically (e.g. if mark-ups are set on unit labor costs at normal capacity utilization). Second, unemployment will typically (though usually with a time lag) have a negative effect on wage demands and the wage share. Endogenizing income distribution nevertheless would require a different modeling strategy, such as the structural VAR approach of Stockhammer and Onaran (2004).

5.1 Consumption

Table 1 reports the results of the estimations of the consumption function. The cointegration test identified no evidence of a long-run relationship between the variables; hence the consumption function was estimated in differences, as in Hein and Vogel

Table 1. Regression results for consumption equation, full sample 1970–2005.

	1970–2005	
Dep. variable:	Δln C	
Variable	Coeff.	t-stat.
c	0.008	2.535**
Δ ln W	0.540	6.198***
Δ ln R	0.119	1.389
Adj, R^2	0.565	
DW stat.	1.889	
Chow test (1987)	prob. 0.513	F: 0.681
Marginal effects (at 1970 values):		
∂C/∂W	0.58	
∂C/∂R	0.19	
∂(C/Y)/∂Ω	0.39	
Marginal effects (at sample means):		
∂C/∂W	0.58	
∂C/∂R	0.20	
∂(C/Y)/∂Ω	0.38	
Marginal effects (at 2005 values):		
∂C/∂W	0.62	
∂C/∂R	0.18	
∂(C/Y)/∂Ω	0.44	

Notes: C, W and R are real consumption, wages and profits respectively.
Chow test null hypothesis: there is no structural break in 1987.
∂C/∂W, ∂C/∂R, ∂(C/Y)/∂Ω are marginal effects of consumption in response to changes of wages, profits and the wage share respectively. The effect of a change in the wage share is calculated as the percentage increase of consumption relative to total GDP. For the full sample marginal effects are calculated at 1970 values, at the mean of the sample and at 2005 values.
***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

(2008, 2009). For econometric reasons the variables enter the estimation in logarithmic form. The consumption elasticity for wages and profits are statistically significant at the 1% level and have values of 0.54 and 0.12 respectively. Since the coefficients are elasticities, they have to be converted into marginal effects by multiplying them by the ratio of consumption to wages and profits respectively.[6] Using the average values over the whole period for C/W and C/R, this yields marginal propensities to consume of 0.58 for wage income and 0.20 for profit income. The difference of these two values (0.38) is the effect of a change in functional income distribution on consumption, which is very close to the results of Naastepad and Storm (2006–07), Hein and Vogel (2008), and Hein and Vogel (2009), who report 0.39, 0.32 and 0.42 respectively. Using the ratios at 1970 and 2005 values, the consumption differential increased from 0.39 to 0.44 during the observed period because of the decline in the wage share.[7]

5.2 Investment

Investment is estimated as a function of (the log of) GDP, (the log of) profits and the real interest rate. The coefficient estimate on profits will yield the effect of an increase in profits given the level of income (and the interest rate) and therefore corresponds to the effect of a change in the profit share. Investment may also have been affected by globalization; therefore the estimation will also be performed for sub-samples to investigate whether changes in the investment function have occurred. In particular, we hypothesize that the profit sensitivity of investment may have increased, because globalization made it easier for firms to move production (and hence investment) abroad if this promises higher profits. OECD (2007) presents evidence that labor demand has become more elastic with respect to real wages since 1980. Presumably, this means that investment also has become more elastic with respect to wages and profits. Indeed, Hatzius (2000) presents evidence for British and German manufacturing industries that foreign direct investment as well as domestic investment have become more elastic with respect to unit labor costs.

In the investigation of the effects of globalization, estimations will frequently be performed for sub-samples. The samples will be split into a first sub-period 1970–1987 and a second one 1988–2006. The year 1987 lies exactly in the middle of our full sample and thus guarantees that both sub-samples have the same (modest) numbers of observations. While the exact choice of the year is arbitrary, experimentation indicated that the precise year makes little difference for the results. Table 2 reports the results of the estimations in difference form, which shows a statistically insignificant effect of profits on investment (and a perverse sign for this effect). The effects of output and of the interest rate are statistically significant and have the expected signs. An increase in real interest rate by one percentage point decreases investment by 1.6% according to our results. Experimentation with the specification and with the lag structure failed to improve the results. The estimations results for sub-periods in differences are of a similar nature; here the elasticity of profits is statistically insignificant (and negative). Based on OECD national account data, our results indicate a lack of any effect of profits on investments that is robust and, hence, will thus be treated as zero.

While these results may appear surprising at first, they are in line with a substantial part of the literature. While there is substantial evidence that changes in demand are the most important single determinant of investment (Chirinko 1993; Ford and Poret

Table 2. Regression results for investment equation, full sample, sub-sample 1970–1987, sub-sample 1987–2005.

	1970–2005		1970–1987		1987–2005	
Dep. variable:	Δln I		Δln I		Δln I	
Variable	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
c	−0.037	−3.031***	−0.042	−1.560	−0.023	−1.797*
Δ ln Y	2.453	4.629***	2.635	2.898**	2.342	3.966***
Δ ln R	−0.017	−0.053	−0.194	−0.331	−0.134	−0.448
Δ i	−0.016	−2.189**	−0.024	−2.137*	−0.001	−0.115
AR(1)	0.407	2.133**	0.592	1.991*	0.150	0.502
Adj, R^2	0.652		0.641		0.758	
DW stat.	1.994		1.898		1.883	
Chow test (1987)	prob. 0.391	F: 1.092				
Marginal effects (at 1970 values):						
∂I/∂R	−0.01					
Marginal effects (at mean values):						
∂I/∂R	−0.01		−0.10		−0.07	
Marginal effects (at 2005 values):						
∂I/∂R	−0.01					

Notes: I, Y, R and i are real business investment, real GDP, profits and the real interest rate respectively.
AR(1) indicates that a correction for first-order autocorrelation has been included.
***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

1991), the role of profits is contested. Our conclusion of the available literature is that studies with disaggregated data (firm-level and sectoral data) often find significant effects of profits (Fazzari and Mott 1986; Hubbard, Kashyap, and Whited 1995). However, with aggregate investment functions, the effects of profits are elusive once changes in demand are controlled for (Ford and Poret 1991). The basic reason for this presumably is that macroeconomically profits and demand are highly correlated, whereas at the firm- (or sectoral-) level profits play more of an independent role.

This pattern, broadly speaking, also holds for Germany. Ford and Poret (1991) find no significant effect of profits for the 1968–88 period when demand is controlled for. Bhaskar and Glyn (1995) use investment over capital stock as dependent variable, and control for GDP growth, and find weak evidence of a positive effect of profits for the period 1955–88, but conclude that profits are not the main determinants of investment. Pugh (1998) finds a significant effect of profits for West Germany, but does not control for demand or any other economic control variable. Naastepad and Storm (2007) estimate the log of the investment share in GDP as a function of the log of GDP and (the log of) the profit share and include a time trend. They find a high effect, with an elasticity of 0.56%. Hein and Vogel (2008) report negative and statistically insignificant effects of the profit share on the log of investment, and Hein and Vogel (2009) obtain slightly positive but also insignificant effects of the profit share on the share of investment in GDP, controlling for the log of GDP in each estimation. Studies with disaggregated data find stronger evidence for effects of profits. Hatzius (2000) uses a panel of manufacturing industries and finds significant effects of profits that are increasing over time. Bond et al. (2003) use firm-level data for the corporate sector and find evidence for a positive impact in some specifications.

5.3 Prices

This paper analyses the demand effects of a change in the wage share. While it does not matter for the effects on consumption and investment expenditures whether an increase (or decrease) in the wage share comes with effects on the price level, it does matter for net exports, because exports and imports will depend on the domestic price level relative to the international price level (assuming that the nominal exchange rate is stable). Therefore the price effects of changes in income distribution have to be analyzed in order to understand the effects on international trade.

As wage negotiations are in nominal terms (though obviously both sides of the negotiations aim at real magnitudes), the starting point of the analysis is a change in *nominal* unit labor costs (ULC).[8] The question is how the change in ULC affects domestic prices, and as a consequence *real* unit labor costs (RULC), and how it affects export prices. These two questions are distinct because export goods have a much higher share of manufacturing goods than overall GDP, which consists to a large part of services that are not internationally traded. Manufacturing goods are typically more capital intensive than services; consequently there are important differences in the corresponding price equations.

Table 3 summarizes the price equations for domestic (GDP-deflator) and export prices. The logs of both price deflators are explained by the log of nominal unit labor costs and the log of import prices. In both cases the equation was estimated in difference form, because there was no evidence of cointegration.

As international trade in the period under investigation has increased, one might expect changes in the relative effects of ULC and import prices in the price

Table 3.1. Regression results for price equation, full sample, sub-sample 1970–1987, sub-sample 1987–2005.

	1970–2005		1970–1987		1987–2005	
Dep. variable:	Δln P		Δln P		Δln P	
Variable	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
c	0.015	4.105***	0.014	4.453***	0.012	1.463
Δ ln ULC	0.420	6.219***	0.524	7.651***	0.286	3.129***
Δ ln PM(–1)	0.072	3.649***	0.075	3.410***	0.112	3.973***
AR(1)	0.674	4.711***	0.071	0.210	0.822	5.618***
Adj, R^2	0.897		0.904		0.835	
DW stat.	1.758		1.642		1.628	
Chow test (1987)	prob. 0.057	F: 2.643				

Notes: P, PM, and ULC are GDP prices, import prices, and nominal unit labor costs respectively.
***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

equations. For both equations the Chow breakpoint test for the year 1987 is suggestive but ultimately inconclusive of the presence of a structural break, as the relevant test fails at conventional levels of statistical significance. In the case of the domestic price equation, the F tests failed to reject the null of no break just above the 5% level; for export prices the Chow test was statistically significant just above the 10% level. The coefficient estimates in the price equation have the expected (positive) signs and are statistically significant at the 1% level in all three samples. The coefficient estimate for ULC is 0.42 in the full sample, and falls from 0.52 in the first sub-sample (1970–1987) to 0.29 in the second sub-sample (1987–2005). All three equations include a correction for first order autocorrelation. The existence of autocorrelation may indicate missing variables; however it is not obvious what these might be.

As (the log of) real unit labor costs equals (the log of) nominal unit labor costs minus the (log of) the price level, the results of the price equation allow for the calculation of the effect of a change in ULC on RULC. The price equation is estimated as $\ln P = b_1 \ln ULC + b_2 \ln P_M + \varepsilon_t$, thus $\frac{\partial \ln P}{\partial \ln RULC} = \frac{b_1}{1-b_1}$.[9] In the full sample, an increase in ULC by 1% will increase prices by 0.42% and RULC by 0.58%. This implies that in order for RULC to change by 1%, a change of ULC of 1.72% is required (in the full sample). Consequently an increase of RULC by 1% will come with an increase in inflation of 0.72% (based on the parameters of the full sample). In the first sub-sample the value was 1.1% and 0.4% in the second sub-sample. This may be a result of the increased openness of the German economy, which limits the ability of firms to pass on nominal unit labor cost hikes to prices (the GDP deflator in this case).

Table 3.2 summarizes the results for export prices. Again coefficients have the expected signs and are statistically significant. The coefficient estimates for import prices (PM) are substantially larger than in the estimations for domestic prices, and the estimates for ULC are somewhat smaller. The elasticity of export prices with respect to ULC is 0.37% in the full sample, and falls from 0.37% in the first sub-sample to 0.21% in the second sub-sample. In the full sample, an increase in RULC by 1%

Table 3.2. Regression results export price equation, full sample, sub-sample 1970–1987, sub-sample 1987–2005.

	1970–2005		1970–1987		1987–2005	
Dep. variable:	Δln PX		Δln PX		Δln PX	
Variable	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
c	0.003	1.124	0.008	0.981	0.001	0.780
Δ ln ULC	0.368	4.270***	0.370	1.923*	0.213	2.648**
Δ ln PM	0.375	11.051***	0.355	6.305***	0.380	7.158***
AR(1)	0.320	1.780*	0.189	0.563	0.054	0.301
Adj, R^2	0.904		0.896		0.793	
DW stat.	1.836		1.753		1.882	
Chow test (1987)	prob. 0.110	F: 2.098				

Notes: PM, PX and ULC are import prices, export prices and nominal unit labor costs respectively.
***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

comes with an increase of export prices by 0.63%, in the first sub-sample by 0.78% and in the second sub-sample by 0.30%.[10]

Overall, we find some evidence for changes in the formation of GDP prices and export prices between the 1970–87 and the 1987–2005 periods. However, the Chow breakpoint tests fail to indicate a break at the conventional 5% level. The changes in the coefficient estimates do correspond to our expectations regarding the changes caused by globalization. But we cannot exclude that other factors are responsible as well. The most obvious candidate, a shift in sector composition, however, would work in the opposite direction. As services increased at the expense of manufacturing, one would expect an increase in the elasticity of prices with respect to ULC, because services are typically more labor intensive than manufacturing goods and they are less exposed to international competition. While we therefore cannot exclude that other factors are also at work, it seems plausible that most of these changes are due to globalization.

5.4 Net exports

Exports are a function of real GDP growth of trading partners (*YW*) and of export prices (*PX*) relative to import prices in domestic currency (*PM*). Imports are a function of real domestic GDP and of export prices relative to import prices. As imports have to be tradable goods and services, the export price deflator is used for the domestic price level, too. While this is an imperfect measure for the goods and services competing with imports, it is a better measure than the GDP deflator, which contains a large share of non-tradables. *YW* has been calculated as trade weighted growth rates of real GDP of the ten most important trade partners, with different trade weights for the pre-1990 and the post-1990 periods.[11]

Again, we investigate whether there have been changes in the relevant parameters due to globalization. In particular, the catching up of many emerging markets and the removal of trade barriers ought to have affected the price elasticities of exports and imports through increased competitive pressures. Therefore, the estimations are, again, also performed separately for the first and the second half of our sample.

Table 4.1 summarizes the results for the export equation. The coefficient estimates have the expected signs and, with the exception of the second sub-sample,

Table 4.1. Regression results export equation, full sample, sub-sample 1970–1987, sub-sample 1987–2005.

	1970–2005		1970–1987		1987–2005	
Dep. variable:	Δln X		Δln X		Δln X	
Variable	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
c	0.004	0.333	0.001	0.082	0.021	0.759
Δ ln YW	2.017	4.469***	1.750	3.815***	1.652	1.622
Δ ln PX/PM	–0.779	–4.491***	–0.666	–3.774***	–1.245	–2.924**
AR(1)	0.245	1.245	–0.111	–0.296	0.086	0.335
Adj, R^2	0.646		0.777		0.605	
DW stat.	1.810		2.085		1.726	
Chow test (1987)	prob. 0.522	F: 0.823				

Notes: X and PX are real exports and export prices respectively.
YW is a trade-weighted measure of the GDP of the main trading partners.
***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

are statistically significant at least at the 5% level. The coefficient estimate for relative prices is –0.78 in the full sample and increases (in absolute value) from –0.67 (in the first sub-sample) to –1.24 (in the second sub-sample).

Table 4.2 presents the results for the import equation. Overall, the import equation does not perform very well. Unit labor costs were lagged one period because the contemporaneous variable had perverse signs. The lagged variable has the predicted sign; however, it is not statistically significant at conventional levels in the full sample and the first sub-sample. In the second sub-sample, it is statistically significant only at the 10% level. The coefficient estimates are economically modest but meaningful. In the full sample the elasticity of imports with respect to ULC is 0.12. In the first sub-period it is 0.24, which increases to 0.31 in the second sub-sample.

Thus, overall, the results are in line with our expectations; however, in the case of imports they lack statistical significance. The price elasticity of exports increased substantially from the first to the second sub-period; the price elasticity of imports

Table 4.2. Regression results import equation, full sample, sub-sample 1970–1987, sub-sample 1987–2005.

	1970–2005		1970–1987		1987–2005	
Dep. variable:	Δln M		Δln M		Δln M	
Variable	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
c	0.013	1.316	0.015	1.109	0.009	0.369
Δ ln Y	1.707	5.339***	1.059	2.020*	2.756	6.876***
Δ ln PX/PM(t–1)	0.121	0.848	0.237	1.450	0.307	1.923*
AR(1)	0.400	2.251**	0.196	0.526	0.732	4.005***
Adj, R^2	0.587		0.626		0.717	
DW stat.	1.781		1.669		2.201	
Chow test (1987)	prob. 0.042	F: 2.913	1.669		2.201	

Notes: M, Y and PX are real imports, real GDP and export prices respectively.
***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

increased moderately. Again, we cannot be sure that all of this change can be attributed to the effects of globalization, though again it is plausible that globalization is a driving force behind them.

The total effects of a change in functional income distribution on net exports result from a long causal chain that goes from real unit labor costs via nominal unit labor and export prices to exports and imports. For the effect on exports, the relevant equation is:

$$\frac{\partial X / Y}{\partial \Omega} = e_{XP_X} e_{P_X ULC} e_{ULC\Omega} \frac{X}{Y} \frac{1}{\Omega} \tag{5}$$

where e denotes an elasticity.

Equation (5) already transforms elasticities into marginal effects and normalizes the results with respect to GDP. The results can be readily interpreted as the effects of a one percentage point increase in the wage share on exports relative to GDP, because RULC is equal to the wage share in our data set. The respective formula for imports is analogous. To derive the total effect on net exports, the effects on exports and on imports have to be added up, taking into account the import content of exports (which was summarized in equation 4).

The increase in international trade is an important aspect of globalization that is reflected in increasing import and export shares. Therefore, it makes a big difference at which point in time the elasticities are converted into marginal effects, which is the subject of the following section.

5.5 Effects of increased globalization

We are now in a position to conclude our findings on the effect of the change in the wage share on net exports. The paper has set out to identify three effects of globalization: rising levels of export shares and import shares; the import intensity of exports; and changes in the values of the parameters of the price equations, as well as those of the import and the export equations. It turns out that it is difficult to arrive at any conclusion by calculating a single value for the effect.

First, there has been a substantial increase in export shares and import shares. Exports have risen from 16% of GDP in 1970 to 45% in 2006. The rise of imports is comparable. With a given price elasticity, the same change in the wage share will thus have a different demand effects on GDP.

Second, globalization has not only increased the export and imports of final goods, but also of intermediate goods; that is, there has been an increase in outsourcing. This poses a conceptual problem here. Unlike consumption and investment expenditures, import and exports are not a value-added magnitude but a measure of gross production value. They include the value of intermediate goods. An increase in the globalization of production will thus inflate imports (and exports) relative to GDP because more intermediaries are imported. If we calculate the effects of price changes on exports and imports, the result will thus be misleading. Therefore, it is necessary to correct for the increasing import content of exports. An increasing import content of exports will, *ceteris paribus*, reduce net exports, the variable we are interested in, and might hence spoil our estimation results for the effects of changes in income distribution on net exports. In order to correct for this effect, we use the data from input–output tables summarized in Table 5. Neipp (1980) calculates that in 1970 the import content of German

Table 5. Import content of exports in Germany, from 1962 to 2000.

Year	Import content	Source
1962	0.19	Stäglin and Wessels (1973)
1966	0.21	Stäglin and Wessels (1973)
1970	0.22	Neipp (1980)
1980	0.25	Brautzsch and Ludwig (2005)
1985	0.26	Brautzsch and Ludwig (2005)
1991	0.26	Brautzsch and Ludwig (2005)
1995	0.30	Brautzsch and Ludwig (2005)
2000	0.38	Brautzsch and Ludwig (2005)

exports was 22%, whereas in 2000 the import content of German exports was calculated to be 38% (Brautzsch and Ludwig 2005). The import content is used as a proxy for the marginal effect of exports on import ($\frac{\partial M}{\partial X}$ in equation 4).

Table 6 summarizes our results for these first two effects. The calculations are performed based on equations (2) and (4). They evaluate the marginal effects of an increase in the wage share by one percentage point for imports and exports in three variants at export and import shares for 1970, the sample mean and 2005 respectively. These scenarios are based on the coefficient estimates for the full sample (1960–2005). In 1970, the export and import share were 16% and 18% respectively, and the import content of exports was 22%. With these values, an increase in the wage share by one percentage point decreases net exports by 0.13% of GDP (Table 6.1). At the sample mean the effect on net exports increased to –0.17% of GDP (Table 6.2). In 2005, the export and import share were 41% and 35% respectively, and the import content of exports is 38%. With these values, an increase in the wage share by one

Table 6.1. Effect chain of an increase in the wage share on net exports at 1970 values.

	1	2	3	4	5	6	7	8
	$e_{ULC\Omega}$	e_{PxULC}	$\frac{e_{XPx}}{e_{MPx}}$	$\frac{e_{X\Omega}}{e_{M\Omega}}$	$1/\Omega$	$\frac{X/Y}{M/Y}$	Import content	$(\partial NX/Y)/\partial\Omega$
Exports	1.72	0.37	–0.78	–0.49	1.69	0.16	0.22	–0.11
Imports			0.12	0.08		0.18		0.02
Sum								–0.13

Notes: The table summarizes the calculations of equations 3 and 5. Sources for the values used are as follows.
Column 1: eULCΩ is calculated as 1 divided by (1-e_{pulc}) (from Table 3.1).
Column 2 estimates from Table 3.2.
Column 3: estimates from Table 4.1 and 4.2 respectively.
Column 4: Wage share elasticities of export and imports calculated by multiplying column 1 values by column 2 values and column 3 values.
Column 5 values are computed by 1 divided by the wage share.
Column 7 is based on data in Table 5 (and interpolation).
Column 8 values are the marginal effects of a one percentage increase in the wage share on net exports. These are calculated by multiplying the respective values in column 4 to 6 for imports and exports.
Values for exports are then adjusted for induced imports by multiplying with one minus the import content (column 7; see also equation 4).

Table 6.2. Effect chain of an increase in real unit labor costs on net exports at mean values.

	1	2	3	4	5	6	7	8
	$e_{ULC\Omega}$	e_{PxULC}	$\frac{e_{XPx}}{e_{MPx}}$	$\frac{e_{X\Omega}}{e_{M\Omega}}$	$1/\Omega$	$\frac{X/Y}{M/Y}$	Import content	$(\partial NX/Y)/\partial\Omega$
Exports	1.72	0.37	–0.78	–0.49	1.64	0.24	0.31	–0.14
Imports			0.12	0.08		0.25		0.03
Sum								–0.17

Notes: The table summarizes the calculations of equations 3 and 5. Sources for the values used are as follows.
Column 1: eULCΩ is calculated as 1 divided by (1-e_{pulc}) (from Table 3.1).
Column 2 estimates from Table 3.2.
Column 3: estimates from Table 4.1 and 4.2 respectively.
Column 4: Wage share elasticities of export and imports calculated by multiplying column 1 values by column 2 values and column 3 values.
Column 5 values are computed by 1 divided by the wage share.
Column 7 is based on data in Table 5 (and interpolation).
Column 8 values are the marginal effects of a one percentage increase in the wage share on net exports. These are calculated by multiplying the respective values in column 4 to 6 for imports and exports.
Values for exports are then adjusted for induced imports by multiplying with one minus the import content (column 7; see also equation 4).

percentage point decreases net exports by 0.27% of GDP (Table 6.3). Thus, the increase in international trade has almost doubled the negative effect of a change in the wage share on net exports.

Thirdly, while the effects discussed so far are relatively clear-cut, the effects of an increase in international competition on the price equation, the export price equation, the export equation and the import equation are more elusive. Often, statistical significance and economic significance (McCloskey and Ziliak 1996; Ziliak and

Table 6.3. Effect chain of an increase in real unit labor costs on net exports at 2005 values.

	1	2	3	4	5	6	7	8
	$e_{ULC\Omega}$	e_{PxULC}	$\frac{e_{XPx}}{e_{MPx}}$	$\frac{e_{X\Omega}}{e_{M\Omega}}$	$1/\Omega$	$\frac{X/Y}{M/Y}$	import content	$(\partial NX/Y)/\partial\Omega$
Exports	1.72	0.37	–0.78	–0.49	1.77	0.41	0.38	–0.22
Imports			0.12	0.08		0.35		0.05
Sum								–0.27

Notes: The table summarizes the calculations of equations 3 and 5. Sources for the values used are as follows.
Column 1: eULCΩ is calculated as 1 divided by (1-e_{pulc}) (from Table 3.1).
Column 2 estimates from Table 3.2.
Column 3: estimates from Table 4.1 and 4.2 respectively.
Column 4: Wage share elasticities of export and imports calculated by multiplying column 1 values by column 2 values and column 3 values.
Column 5 values are computed by 1 divided by the wage share.
Column 7 is based on data in Table 5 (and interpolation).
Column 8 values are the marginal effects of a one percentage increase in the wage share on net exports. These are calculated by multiplying the respective values in column 4 to 6 for imports and exports.
Values for exports are then adjusted for induced imports by multiplying with one minus the import content (column 7; see also equation 4).

Table 7.1. Parameter changes in price, export and import functions.

Sample	e_{PULC}	$e_{ULC\Omega}$	e_{PxULC}	e_{XPx}	e_{MPx}	$e_{X\Omega}$	$e_{M\Omega}$
1970–2005	0.42	1.72	0.37	−0.78	0.12	−0.49	0.08
1970–1987	0.52	2.10	0.37	−0.67	0.24	−0.52	0.18
1987–1990	0.29	1.40	0.21	−1.24	0.31	−0.37	0.09
Chow break point tests (1987)							
F-stat.	2.64		2.10	0.82	2.91		
Prob.	0.06		0.11	0.52	0.04		

Note: This table summarizes the parameter estimates for different sub-periods based on the results from Tables 3 and 4.

McCloskey 2004) do not coincide. Table 7.1 summarizes the test statistics for the Chow test of a break in 1987, which is exactly at the middle of our sample, as well as of the relevant parameter estimates. Only one equation, the import equation, exhibits statistical evidence of a structural break at the 5% level. However, there are two problems with this equation. First the change in the relevant parameter is economically modest. Second, there is an inconsistency in the results: the parameter estimate for the total sample is below the parameter estimate for either sub-sample, which intuitively makes little sense.

The price equation shows a break that is statistically significant at the 10% level only. However, the change in the parameter estimate is economically substantial as the parameter value is almost halved. Finally, the Chow test unambiguously fails to reject the null that there is no structural break in the export function. However, the parameter estimates for the two subsamples differ dramatically. According to the estimates, the price elasticity of exports doubled.

We conclude the following from the analysis of the sub-samples. It seems that our sub-samples are too small to give precise estimates. The changes in the relevant behavioral functions are economically substantial and the parameter change in the expected direction. The elasticity of domestic prices and export prices with respect to unit labor costs decreases and the price elasticities of exports and imports increase. However, Chow tests do not confirm that there has been a statistical break in the behavioral function. For all but two equations, the null hypothesis of no break is not rejected (at the 10% level). Moreover, the economically relevant parameter changes do not coincide with statistically significant Chow tests. The strongest parameter change is in the export equation, where there is no evidence of a break. We will thus not utilize the coefficients from the sub-sample estimates for the final calculations.

While not statistically significant, many of the changes of the parameter estimates for our sub-samples are economically significant in the sense that the parameter changes can make a substantial difference in the calculations. As all parameters change in the expected direction, it seems unwise to completely discard this information. Tables 7.2 and 7.3 thus summarize calculations for the two sub-samples to give the reader a better understanding of how the statistically unreliable parameter changes would affect the total outcome. These calculations have to be interpreted with caution and should only be taken as being indicative of the direction of change. Note that the changes in the price equation, on the one hand, and the changes in the import and export equation, on the other, work in different directions. While the ULC plays a smaller role in price determination in the second sample, exports and imports have

Table 7.2. Effect chain of a change in real unit labor costs on net exports, sub-sample 1970–1987.

	$\frac{e_{X\Omega}}{e_{M\Omega}}$	$1/\Omega$	$\frac{X}{Y}$ / $\frac{M}{Y}$	Import content	$(\partial NX/Y)/\partial\Omega$
Exports	–0.52	1.60	0.20	0.28	–0.12
Imports	0.18		0.22		0.07
Sum					–0.19

Note: This summarizes the calculations of equation 3 for the two sub-periods.

Table 7.3. Effect chain of a change in real unit labor costs on net exports, sub-sample 1987–2005.

	$\frac{e_{X\Omega}}{e_{M\Omega}}$	$1/\Omega$	$\frac{X}{Y}$ / $\frac{M}{Y}$	import content	$(\partial NX/Y)/\partial\Omega$
Exports	–0.37	1.68	0.29	0.33	–0.12
Imports	0.09		0.27		0.04
Sum					–0.16

Note: This summarizes the calculations of equation 5 for the two sub-periods.

become more sensitive to price changes. Surprisingly, it turns out that the changes almost cancel out each other. The overall change in net exports caused by a change in the wage share is, for practical purposes, almost identical in the first sub-sample and the second sub-sample. The elasticity of exports and imports with respect to real unit labor costs has decreased, despite the fact that the elasticity with respect to export prices has increased, because prices have become less responsive to unit labor costs. Because of an increase in export and import shares, the overall effects are very similar. While there seem to have been several changes in the behavioral functions, we have little evidence that the overall effect has changed.

Finally, remember that the hypothesis that investment may have become more sensitive to profitability because of the increase in capital mobility was investigated above (Table 2). No effect of profits on investment was found, neither in the full sample nor in the sub-samples. This absence of profit effect is robust to changes in specifications.

5.6 Total effects

To illustrate the total effects and their changes over time, Table 8 puts together the partial results presented above evaluated for respective demand shares in GDP at the beginning (1970), the mean and the end (2005) of our sample. The positive effect of an increase in the wage share by one percentage point on private consumption is 0.39% of GDP in 1970, 0.38% at mean values and 0.44% of GDP in 2005. As the wage share rises mildly from 1970 to the sample mean, the consumption differential increases slightly. The wage share sharply declines afterwards, which widens the consumption differential (with given consumption elasticities). We failed to find evidence that profits affect investment expenditures in Germany. The relevant coefficients were statistically insignificant and frequently

Table 8. Private excess demand (in percentage points of GDP) caused by a 1 percentage point increase of the wage share.

	1970	Mean	2005
Consumption	0.39	0.38	0.44
Investment	–	–	–
Net exports	0.13	0.17	0.27
Private excess demand	0.27	0.21	0.17

Note: Data are taken from Tables 1 (for consumption), 2 (for investment) and 6 (for net exports).

showed perverse effects. Therefore, the investment effects are excluded and the *domestic sector* of the economy is thus clearly wage led.

The effects of changes in the wage share on net exports have been extensively discussed in the previous section. Table 8 restates the effects from Tables 6.1 to 6.3. A one percentage point change in the wage share led to a decrease of net exports by 0.13% of GDP in 1970. By 2005, this effect has doubled to 0.27%. At the sample mean, the value is in between at 0.17%. These values result from a dynamic increase in international trade. Despite this tremendous increase in the effect on net exports, the effect is still substantially smaller than the effect on consumption. Private excess demand is clearly wage-led, though the actual value decreases over time. A one percentage point increase in the wage share led to an increase in private excess demand by 0.27% of GDP in 1970 and to 0.17% in 2005.

To get the total private effects of a change in income distribution on *equilibrium demand,* excess demand has to be multiplied by the multiplier of equation 4, that is $\frac{1}{1-h_1}$. As these results would have to be interpreted as general equilibrium effects, we abstain from this exercise because the exogeneity assumptions outlined in section 2 seem rather strong in this context.[12] Moreover, the results would be sensitive to the specific parameters applied. h_1 consists of the partial effects of changes in income on consumption, investment and imports. As our equations describe short-run effects, the accelerator term would be difficult to interpret.

The qualitative result of this study is thus clear: wage moderation will overall have negative effects on (private) aggregate demand in Germany. A plausible, conservative point estimate of the total effect is 0.17% of GDP. Globalization has affected how changes in the income distribution affect aggregate demand, but these effects have been and still are rather modest. The changes have not been sufficient to undermine the wage-led demand regime in Germany.

According to our results the decline of the wage share since 1996 (to 2005) by more than three percentage points has dampened GDP by (cumulatively) around one half of a percentage points for the period 1996–2005. Given that German GDP growth has been trailing growth in the other Euro area countries by around 0.5% per annum, it is obvious that the change in functional income distribution only explains a small fraction of Germany's poor macroeconomic performance. As has been argued in the qualitative economic policy studies on the performance of the German economy in international comparison by Hein and Truger (2005, 2007, 2009), differences in real interest rates and, in particular, in the fiscal policy stance have played an important role for Germany's weakness. Exact quantitative estimations on the effects of these policy areas on GDP growth, however, remain to be done in future research.

6. Conclusions

Globalization has various effects on how distribution affects aggregate demand. Econometric evidence was found for changes in the elasticities of prices to import prices and wage costs. However, these changes, while economically significant, are often not statistically significant and seem to be roughly offsetting each other. We failed to find evidence of changes in the investment function. The single biggest effect from globalization comes from the increase in international trade (even once this is corrected for the increased import content of exports).

The effects of increased trade are substantial and relevant. However, in the case of Germany they are not large enough to switch the demand regime that remains wage-led. This finding is consistent with the fact that the German economy has underperformed the rest of the EU and the EMU for a considerable period of time now (Hein and Truger 2005, 2007). This finding has interesting policy implications. The constraints on domestic wage policy do not seem to be as big as sometimes thought because the different effects of globalization work in opposite directions. However, this does not mean that globalization does not have to be taken seriously. It does affect the demand regime and, presumably, many small economies will exhibit profit-led demand regimes because of globalization.[13]

There are several limitations of the approach taken here that should be addressed by future research. An important part of the analysis of the effects of globalization operated through investigating whether changes in key behavioral functions have occurred. This strategy is limited on two dimensions. First, it runs up against decreasing degrees of freedom. Consequently, the estimates lack precision and statistical reliability. This problem could be addressed by means of panel analysis of several countries. Second, globalization itself does not enter as an explanatory variable. To address this issue one would need a proxy for competitive pressure that is linked to globalization.

Acknowledgements

The authors are grateful to Stefan Ederer, Özlem Onaran and two anonymous referees for comments. Support from FWF Project nr. P18419-G05 is acknowledged. The major part of the paper was written while Eckhard Hein was a visiting professor at Vienna University of Economics and Business Administration. The hospitality of the Vienna University is gratefully acknowledged. The usual disclaimers apply.

Notes

1. In traditional Kaleckian models, an increase in the wage share leads to an increase in aggregate demand. We use the term post-Kaleckian for a generalization of these models that allow for profit-led as well as for wage-led demand regimes. Kaleckian and post-Kaleckian models are both part of a broader class of post-Keynesian models that highlight the central role of aggregate demand. The distinguishing feature of Kaleckian and post-Kaleckian models is that they treat capacity utilization as an endogenous variable, also in the long run. For a survey, see Blecker (2002).
2. These values are synthethic values for Germany that are used in the econometric analysis. It consists of German data from 1991 onwards that are chained backwards with West German growth rates for the period 1970–1990. The West German export share in 1970 was 21%.
3. According to AMECO data, Germany's nominal compensation grew by 0.9% annually compared to a 1.3% in the Euro area in the period 1996 to 2006. Over the same period productivity (per employee) grew by 1.8% and that of the Euro area by 1.3%.

4. Functional income distribution and its measure, the wage share, are used synonymously throughout this paper.
5. An extended version of the paper that includes unit root tests and some ECM results is available from the authors upon request.
6. $\frac{\partial C}{\partial W} = e_{CW}\frac{C}{W}$, where e_{CW} is the elasticity of consumption with respect to wages.
7. As we have no reason to expect that globalization has influenced the consumption differential, no estimations for sub-periods are reported for consumption. The Chow test found no evidence of a break point in 1987.
8. Note that a change in nominal unit labor costs can also occur because of a technology shock.
9. Note that $RULC = \Omega = ULC / P$.
10. The elasticity of export prices with respect to real unit labor is $e_{P\times\Omega} = e_{P\times ULC}e_{ULC\Omega}$. The respective values can also be read from Table 7.
11. Germany's main trading partners are France, USA, UK, Italy, Netherlands, Belgium, Austria, Switzerland, Spain, Poland, Sweden, Japan, China, Czech Republic and Denmark. The weights were computed with the mean shares of exports and imports for two different periods 1969 to 1989 and 1989 to 2005, using trade data from 1969, 1979, 1989 1991, 1994, 1997, 2002 and 2005.
12. Note that the private excess demand effects discussed above are by definition partial (and disequilibrium effects). Here, however, the effects are general equilibrium effects. The assumption that other control variables are exogenous with respect to income and income distribution is therefore much more restrictive.
13. See the results in Hein and Vogel (2008) and in Stockhammer and Ederer (2008) for Austria and the Netherlands.

References

Bhaduri, A., and S. Marglin. 1990. Unemployment and the real wage: The economic basis for contesting political ideologies. *Cambridge Journal of Economics* 14: 375–93.

Bhaskar, V., and A. Glyn. 1995. Investment and profitability: The evidence from the advanced countries. In *Macroeconomic policy after the conservative era. Studies in investment, saving and finance,* ed. G. Epstein and H. Gintis, 175–96. Cambridge: Cambridge University Press.

Blanchard, O. 2006. *Macroeconomics,* 4th edition. Upper Saddle River, NJ: Prentice Hall.

Blecker, R. 1989. International competition, income distribution and economic growth. *Cambridge Journal of Economics* 13: 395–412.

Blecker, R. 1999. Kaleckian macromodels for open economies. In *Foundations of international economics: post Keynesian perspectives,* ed. J. Deprez and J.T. Harvey, 116–49. London and New York: Routledge.

Blecker, R. 2002. Distribution, demand and growth in neo-Kaleckian macro-models. In *The economics of demand-led growth,* ed. M. Setterfield, 129–52. Cheltenham, UK: Edward Elgar.

Bond, S., J. Elston, J. Mairesse, and B. Mukay. 2003. Financial factors and investment in Belgium, France, Germany, and the United Kingdom: A comparison using company panel data. *Review of Economics and Statistics* 85, no. 1: 153–65.

Bowles, S., and R. Boyer. 1995. Wages, aggregate demand, and employment in an open economy: An empirical investigation. In *Macroeconomic policy after the conservative era. Studies in investment, saving and finance.* ed. G. Epstein and H. Gintis. Cambridge: Cambridge University Press.

Brautzsch, H., and U. Ludwig. 2005. Ganz Westeuropa auf dem Weg in die Basarökonomie? *Wirtschaftsdienst* 8, no. 05: 513–17.

Chirinko, R. 1993. Business fixed investment spending: Modeling strategies, empirical results and policy implications. *Journal of Economic Literature* 31: 1875–911.

Ederer, S., and E. Stockhammer. 2007. Wages and aggregate demand in France: An empirical investigation. In *Money, Distribution, and economic policy – alternatives to orthodox macroeconomics,* ed. E. Hein and A. Truger, 119–38. Cheltenham, UK: Edward Elgar.

Fazzari, S., and T. Mott. 1986. The investment theories of Kalecki and Keynes: An empirical study of firm data, 1970–1982. *Journal of Post Keynesian Economics* 9, no 2: 171–87.

Ford, R., and P. Poret. 1991. Business investment: recent performance and some implications for policy. *OECD Economic Studies* 16: 79–131.
Hatzius, J. 2000. Foreign direct investment and factor demand elasticities. *European Economic Review* 44, no. 1: 77–143.
Hein, E., T. Schulten, and A. Truger. 2006. Deflation risks in Germany and the EMU: The role of wages and wage bargaining. In *Wages, employment, distribution and growth. international perspectives,* ed. E. Hein, A. Heise, and A. Truger, 67–92. Basingstoke, UK: Palgrave Macmillan.
Hein, E., and A. Truger. 2005. Whatever happened to Germany? Is the decline of the former European key currency country caused by structural sclerosis or by macroeconomic mismanagement? *International Review of Applied Economics* 19: 3–28.
Hein, E., and A. Truger. 2007. Germany's post-2000 stagnation in the European context – a lesson in macroeconomic mismanagement. In *Aspects of modern monetary and macroeconomic policies,* ed. P. Arestis, E. Hein, and E. Le Heron, 223–47. Basingstoke, UK: Palgrave Macmillan.
Hein, E., and A. Truger. 2009. How to fight (or not to fight) a slowdown: Lessons from France, Germany, the UK and Sweden, 1996–2005. *Challenge* 52, no. 3: 52–75.
Hein, E., and L. Vogel. 2008. Distribution and growth reconsidered – empirical results for six OECD countries. *Cambridge Journal of Economics* 32: 479–511.
Hein, E., and L. Vogel. 2009. Distribution and growth in France and Germany – single equation estimations and model simulations based on the Bhaduri/Marglin-model. *Review of Political Economy* 21, no. 2: 245–72.
Hubbard, R., A. Kashyap, and T. Whited. 1995. Internal finance and firm investment. *Journal of Money, Credit and Banking* 27, no. 3: 683–701.
Kalecki, M. 1954. Theory of economic dynamics. In *Collected works of Michal Kalecki,* vol. 1, ed. J. Osiatynski, . Oxford: Clarendon Press.
Marglin, S., and A. Bhaduri. 1990. Profit squeeze and Keynesian theory. In *the golden age of capitalism. Reinterpreting the postwar experience,* ed. S. Marglin, and J. Schor, 153–86. Oxford: Clarendon Press.
McCloskey, D., and S. Ziliak. 1996. The standard error of regressions. *Journal of Economic Literature* 34, 1: 97–114.
Naastepad, C.W.M., and S. Storm. 2006–07. OECD demand regimes (1960–2000). *Journal of Post-Keynesian Economics* 29: 213–48.
Neipp, J. 1980. Zur *Bedeutung der Input-Output-analyse für eine Statistik des Aussenhandels.* Frankfurt/Main: R.G. Fischer Verlag.
OECD. 2007. Workers in the global economy: Increasingly vulnerable? In *OECD Employment Outlook 2007,* ch. 3. Paris: OECD.
Onaran, Ö., and E. Stockhammer. 2005. Two different export-oriented growth strategies: Accumulation and distribution à la Turcu and à la South Korea. *Emerging Markets Finance and Trade* 41, no. 1: 65–89.
Pugh, G. 1998. The profit elasticity of investment in West Germany and the investment diversion effects of unification. *Applied Economics Letters* 5: 97–9.
Stäglin, R., and H. Wessels. 1973. *Input-Output-Rechnung für die Bundesrepublik Deutschland 1954, 1958, 1962, 1966.* DIW Beträge zur Strukturforschung Heft 27. Berlin: Duncker und Humboldt.
Stiglitz, J., and A. Weiss. 1981. Credit rationing in markets with imperfect information. *American Economic Review* 71: 393–410.
Stockhammer, E., and S. Ederer. 2008. Demand effects of the falling wage share in Austria. *Empirica* 35, no. 5: 481–502.
Stockhammer, E., Ö. Onaran, and S. Ederer. 2009. Functional income distribution and aggregate demand in the Euro area. *Cambridge Journal of Economics* 33, no. 1: 139–59.
Stockhammer, E., and Ö. Onaran. 2004. Accumulation, distribution and employment: A structural VAR approach to a Kaleckian macro-model. *Structural Change and Economic Dynamics* 15: 421–47.
Ziliak, S., and D. McCloskey. 2004. Size matters: The standard error of regressions in the American Economic Review. *Econ Journal Watch* 1, no. 2: 331–58.

Appendix

Table A.1. Variable definitions.

Notation	OECD Notation	Description
Ω	–	Wage share (identical to real unit labor costs)
C	CPV	Private consumption, real
I	IPV	Private investment, real
i	IRLR	Long-term real interest rate, deflated by GDP deflator
M	MGSV	Imports, real
P	PGDP	GDP deflator
P_M	PMGS	Import price deflator
P_X	PXGS	Export price deflator
R	–	Gross operating surplus, real, deflated by GDP deflator
RULC	–	Real unit labor costs (identical to the wage share)
ULC	ULC	Nominal unit labor costs
W	–	Compensation of employees real, deflated by GDP deflator
X	XGSV	Exports, real
Y	GDPV	GDP, real
YW	–	Trade weighted GDP of main trading partners, real