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Working Paper

Original Citation:

Stockhammer, Engelbert and Ederer, Stefan (2007) Demand effects of the falling wage share in Austria. *Department of Economics Working Paper Series*, 106. Inst. für Volkswirtschaftstheorie und -politik, WU Vienna University of Economics and Business, Vienna.

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Demand effects of the falling wage share in Austria^{*}

Engelbert Stockhammer[†], Stefan Ederer[‡]

Working Paper No. 106, August 2007

Abstract — *This paper aims at empirically estimating the demand effects of changes in functional income distribution for Austria. Based on a Post-Kaleckian macro model, this paper estimates the effects of a change in the wage share on the main demand aggregates. The results for the behavioral functions for consumption, investment, prices, exports and imports are compared with the specifications of the WIFO macro model and the IHS macro model. A reduction in the wage share has a restrictive effect on domestic demand as consumption decreases more strongly than investment increases. Because of the strong effects on net exports the overall effects of a decrease in the wage share are expansionary. However the latter effect operates only as far as the fall in the wage share increases competitiveness. As wage shares were also falling in Austria's main trading partners, the effect seems to have been neutralized.*

Keywords: distribution, demand, investment, consumption, foreign trade, macroeconomics, Keynesian economics

JEL-Classification: E12, E20, E22, E25, E61

^{*} The authors are grateful to Amit Bhaduri, Kazimierz Laski, Özlem Onaran and Martin Riese for comments. Support from FWF Project Nr. P18419-G05 is acknowledged. The usual disclaimers apply.

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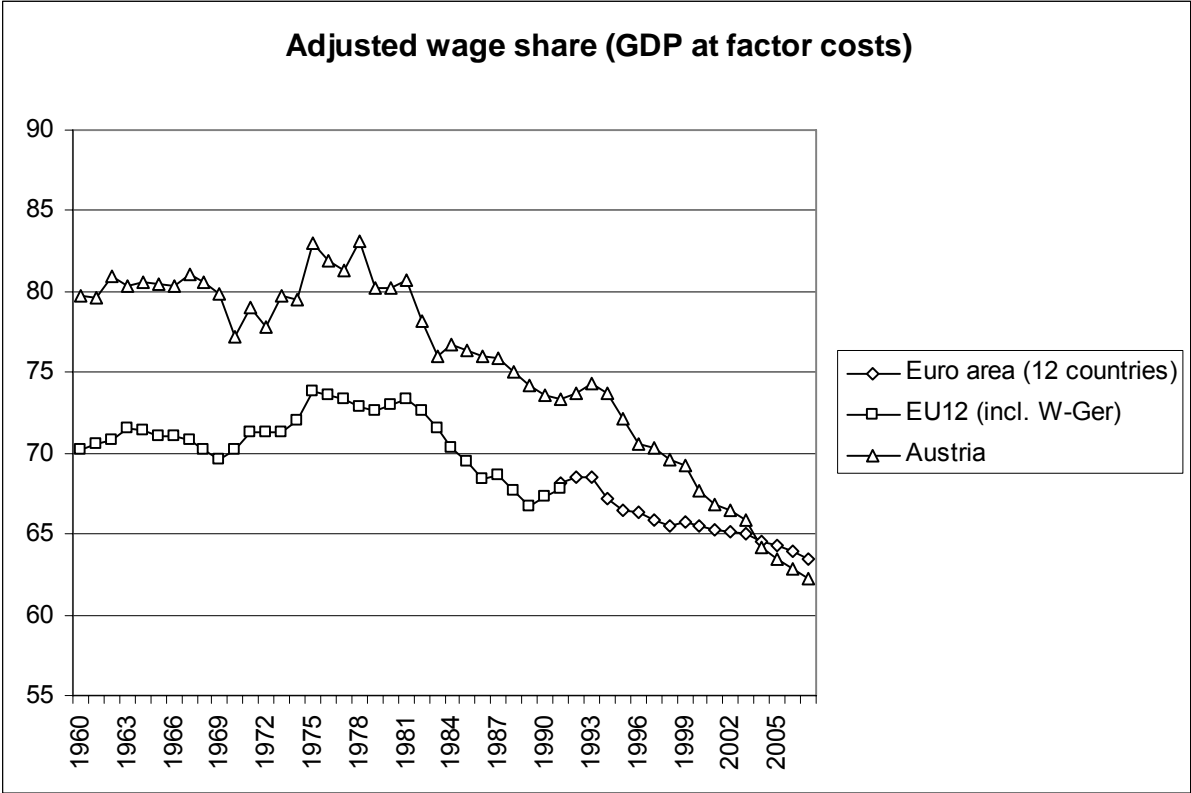
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1 Introduction

The wage share has fallen substantially in Austria over the past 25 years (Figure 1). While the causes for this fall have recently been subject to debate,¹ there has been comparatively little research its effects. In particular there is no analysis of its effects on aggregate demand. A priori one would expect a rise in the wage share to have a positive effect on consumption, a negative effect on investment expenditures and a negative effect on net exports (because given the level of productivity an increase in the wage share implies a loss in international competitiveness). However, most of today's macro economic theory does not attribute much significance to functional income distribution in the formation of aggregate demand, as a look into intermediate or advanced macroeconomic textbooks (Blanchard 2006, Mankiw 2006, Romer 2006) will readily confirm. This is also reflected in the most widely used macroeconomic models for Austria, the WIFO model (Baumgartner, Breuss and Kaniovski 2004) and the IHS model (Hofer and Kunst 2005). Both do not include the wage share explicitly. However, both include the unit labor costs as influencing prices and net exports.

¹ Marterbauer and Walterskirchen (2003) investigate the Austrian case and highlight the role of unemployment. IMF (2007), and OECD (2007), investigate the effects of globalization, Breuss (2007) explicitly includes the effects of Eastern Enlargement.

Figure 1: Adjusted wage share in Austria and the Euro area



Source: AMECO

The neglect of income distribution in today’s macroeconomics is in contrast to a long-standing tradition in economics that has given income distribution a prominent role in demand formation. Most of classical economics was centered around the distribution of income between landowners, capitalists and workers (Ricardo 1951, Marx 1976). In the postwar era Post Keynesian economists (Robinson 1956, 1962, Kalecki 1954, 1971, Kaldor 1956, 1957) have highlighted the role of income distribution. In these models functional income distribution would affect demand even in a closed economy setting as wage incomes typically are associated with higher marginal propensities to consume than capital incomes and investment is, to some part, financed out of retained earnings.

In this paper the question what the effects of a change in the wage share on aggregate demand is, will be investigated empirically for Austria based on a Post-Kaleckian macro

model. The model estimated is a version of the Bhaduri and Marglin (1990) model which allows for wage-led as well as for profit-led demand regimes according to the relative size of the consumption differential, the sensitivity of investment to profits and the sensitivity of net exports to unit labor costs.

While the theoretical model is Post-Keynesian, our estimation strategy is pragmatic. Each behavioural function is estimated in a form that ensures comparability with the respective specifications in the WIFO macro model and the IHS model; the key difference being that measures of functional income distribution are included. In doing so, we hope to demonstrate the plausibility of our results, but also to prepare the ground for a fruitful discussion between Post Keynesian and ‘mainstream’ economics.² Thus our specifications can be seen as extensions rather than criticisms of these models.

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

2 Theoretical background: wage-led und profit-led demand regimes

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

² A discussion of what ‘mainstream’ economics is beyond the scope of this paper. As the most widely used macro models for Austria, the WIFO model and the IHS model by definition qualify as mainstream. Both are short run models with a Keynesian flavour which, on a theoretical level, is why the behavioural equations estimated are comparable, if different in detail, with our Post-Kaleckian model. New Keynesian macro models that use long run restrictions extensively, like the OeNB model (Fenz and Spitzer 2005), would be much more difficult to compare to our model.

model allows for wage-led as well as profit-led demand regimes and is similar in spirit to Bhaduri and Marglin (1990). While in the classical Kaleckian model (for a closed economy) an increase in the wage share will always lead to an increase in demand (Kalecki 1954, Rowthorn 1989, Blecker 1999), this is not necessarily the case here because there is a positive effect of profits on investment that has been highlighted by classical economics (Ricardo 1951, Marx 1976) and the recent literature on the role of internal finance because of imperfections on the credit market (Fazzari and Mott 1986, Hubbard 1998). The question whether the positive effect of wages on consumption or the negative effect of profits on investment is larger, becomes an empirical one. In an open economy additional negative effects will operate through net exports (Blecker 1989, 1999, 2002).

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), and some other control variables (summarized as z). These latter are assumed to be independent of output and distribution. Government expenditures are considered a function of output only. Aggregate demand then is:

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

$$\text{and } P = f(\Omega, z_P) \quad (2)$$

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. For example the WIFO and the IHS models do not include effects of income distribution on consumption and

investment.³ Only in the net exports function does income distribution usually play a role, albeit in an indirect way. Typically export and import functions include a price term and prices are thought to depend (among other things) on unit labor costs. Unit labor costs are by definition related to the wage share.

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 incomes than for wage income; consumption is therefore expected to increase when the wage share rises. Standard investment functions depend on output and the real interest rate or some other measure of the cost of capital. In addition to that, investment in our model 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 the capital accumulation was a positive function of the rate of profit. Consequently investment ought to be a function of profits. Today it is often argued that retained earnings are a privileged source of finance and may thus influence investment expenditures. This had already been highlighted by Kalecki (1954) and been rediscovered in the 1980s by mainstream economists (Stiglitz and Weiss 1981).

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 unit labour costs (ULC) and import prices. This is the structure in our model as well as the WIFO model and the IHS model. It is important to note that this structure implies that net exports depend (among other things) on (changes in) the wage share. As the price equation indicates the marginal effect of a change in ULC on prices, expressing the relation between

³ In the case of consumption one may argue that there is an indirect effect because a redistribution from, say, profits to wages will affect disposable income as part of profits are retained and thus do not enter disposable income.

real unit labor costs and prices is only a matter of re-parameterization.⁴ As real unit labor costs are by definition related to the wage share, domestic prices are thus a function of the wage share (as in equation 2).⁵

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.

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)⁶ is taken as exogenous. Thus feedbacks, for example, from growth on income distribution via lower unemployment and a better bargaining position of labour are ignored at this stage. It is therefore a partial model of a basic private open economy type. Because of our focus on the effect of changes in the functional income distribution, the effects of fiscal policy are excluded from the analysis.

Differentiating Y with respect to Ω and collecting terms gives

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

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

⁴ Assume a price equation of the form $\ln P = f(\ln ULC, z_p)$. Real unit labor costs (RULC) defined as ULC/P and are identical to the wage share; thus $\ln \Omega = \ln ULC - \ln P$. Then $e_{PRULC} = e_{PULC}/(1 - e_{PULC})$, where e_{PRULC} is the elasticity of prices with respect to RULC and e_{PULC} is the elasticity of prices with respect to ULC.

⁵ In the OECD data set that is used for the empirical analysis, ULC are defined as nominal output divided by real productivity. Real unit labor costs are defined as nominal labor unit costs divided by the GDP deflator. Therefore, in this definition, real unit labor costs are identical to the wage share.

⁶ Functional income distribution and its measure, the wage share, are used synonymously throughout this paper.

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 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*.

Given that Austria is a small open economy, one would expect net exports to play a major role in empirically determining the overall outcome. However, it is important to distinguish between the domestic sector of the economy and the open economy for policy reasons as well as for theoretical ones. For economic policy it is important to realize that while individual countries can increase demand by increasing exports, the world as a whole of course cannot. Therefore with respect to the empirical investigation, what is at stake is whether private excess demand in the *domestic sector* is wage-led or profit-led. The domestic sector is defined with respect to consumption and investment only, assuming that the net export position does not change (as would be the result if wages were to change simultaneously in all countries). If consumption reacts more sensitively to an increase in the wage share than investment, domestic demand will be wage-led.

3 Related literature

The Bhaduri and Marglin (1990) model is a flexible Post-Kaleckian macro model that is widely used in modern Post Keynesian economics.⁷ It differs from the classical Kaleckian model as it allows for wage-led as well as profit-led demand regimes. The question whether the positive effect of an increase in the wage share on consumption outweighs the negative effect on investment and on net exports becomes an empirical one. It has thus inspired empirical literature, which will briefly be surveyed here. As none of this empirical literature (with one exception) refers Austria, some papers on Austria that have a different theoretical background are also covered.

The empirical 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 labour productivity growth for the USA, UK and France. The goods market is modelled 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 Korea. The advantage of the systems approach is that the interaction between the variables can be incorporated. The disadvantage of the VAR is that it is difficult to identify effects of individual variables.

The second group of papers focuses on the goods market 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). While the paper has become a seminal reference point for later research, the econometric methods employed are not up-to-date. In

⁷ Kaleckian economics is considered one of the main streams within Post Keynesian economics.

particular, they fail to discuss the time series properties of the economic variables and ignore the issue of unit roots. As a consequence, they do not apply difference or error correction models that form the core of modern time series econometrics. Hein and Ochsén (2003) focus on the interest rate as exogenous variable and estimate savings and investment econometrically and try to characterise the accumulation regimes of France, Germany, the USA and the UK. Naastepad and Storm (2006/2007) estimate a similar model for eight OECD countries. The estimated model is strictly derived from the theoretical one. Consequently the estimated equations are typically in ratio form, which are not the ones favoured by modern time series econometrics. Compared to our findings, their effects on consumption and investment are high, but those on net exports are small.

Our approach is similar in spirit to Bowles and Boyer (1995) but uses modern econometric techniques and seeks comparability with standard behavioral equations. A similar approach has been taken by Ederer and Stockhammer (2007) for France and by Stockhammer, Onaran and Ederer (2007) for the Euro area. Hein and Vogel (2007), building on Ederer and Stockhammer (2007) estimate a similar model for Austria, France, Germany, the Netherlands, UK and the USA, but offer a much simpler treatment of international trade.

Other than Hein and Vogel (2007) no estimations of the Bhaduri-Marglin model are available for Austria. Hein and Vogel offer no detailed discussion of the Austrian case. The differences and similarities will be discussed below. Marterbauer et al. (2006) is related to the behavioural assumption of the Post-Keynesian consumption function without sharing its theoretical basis. They calculate different consumption propensities according to income groups for Austria. The lowest income third has a long-run marginal propensity to consume of 0.8, whereas for the highest third they get 1.2.

Throughout the empirical section comparisons will be made to the WIFO model of the (Baumgartner, Breuss and Kaniowski 2004) and the IHS model (Hofer and Kunst 2005). These are the two best established macro-econometric models for the Austrian economy and

are used for short to medium run simulations. Both are similar in structure and complexity (consisting of some 30 behavioural and roughly the same number of identities). While we use these models for comparisons of individual behavioural equations, they have been built as full macroeconometric models without necessarily optimizing the fit of an individual equation. However, the equations can still serve as a reference point in checking the plausibility of our results.

4 Empirical results

The model is estimated by means of separate single equations for consumption, investment, exports and imports. As far as possible, the specifications were chosen as to be consistent with the macroeconomic models for Austria of WIFO and IHS and augmented for a distributional variable. The econometric specifications are following the standard practice in modern econometric modelling. Thus, error correction models (ECM) are estimated whenever feasible. When the results were unsatisfactory and/or there was no indication of cointegration, an unrestricted autoregressive distributed lag model (ADL) was estimated. ADL models are general in that various specifications can be written as restrictions on an ADL model. In all cases where ECM specifications did not work, the ADL suggested that a difference model should be applied.

All data is taken from the OECD Economic Outlook database (downloaded in 2006). The sample is 1960-2005. 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. In the OECD database, the wage share and real unit labor costs are identical by definition. Variable definitions can be found in the Appendix (Table A.1). Unit root tests⁸ suggest that all these variables are integrated of order one (I (1)). Thus,

⁸ The results of the unit root tests are reported in the Appendix (Table A.2).

ECM, ADL or difference specifications are applicable. WIFO and IHS are using annual data of the national accounts published by Statistik Austria. The results of our estimations therefore may therefore differ from the WIFO and IHS estimations because of the database. However this difference should be minor.

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

4.1 Consumption

Consumption usually is estimated as a function of income. In order to include a distributional variable in the consumption function, we apply two different strategies. First, income is separated into wage income and profit income. When estimated separately, the difference between the marginal propensities to consume out of wages and profits gives the effect of a change in functional income distribution. Second, the wage share (Ω) is directly included as explanatory variable.

In our estimations the GDP of the private sector stands for income. In standard macroeconomic models like the WIFO and the IHS model, disposable income is used as explanatory variable. As tax cannot be assigned to wage and profit incomes, functional income distribution cannot be calculated on the basis of disposable income. In our estimations therefore we use GDP of the private sector as income.

Table 1 reports the results of the estimations. The ADF test rejected cointegration at the 10% level, which is rather surprising because consumption functions usually are modelled as ECM.⁹ The test results however are close to the critical values, thus we also estimate the two functions as ECMs. For econometric reasons all variables in the equations are in logarithmic form.¹⁰ The relevant coefficients of both estimations are meaningful and statistically significant.

Table 1: Regression results for the consumption function

| Dependent variable: $\Delta \ln C$ | | | Dependent variable: $\Delta \ln C$ | | |
|--|--------|-------|------------------------------------|--------|-------|
| Variable | Coeff. | Prob. | Variable | Coeff. | Prob. |
| c | 1.97 | 0.01 | c | 0.23 | 0.04 |
| $\Delta \ln W$ | 0.47 | 0.00 | $\Delta \ln \Omega$ | 0.06 | 0.67 |
| $\Delta \ln R$ | 0.25 | 0.00 | $\Delta \ln Y$ | 0.67 | 0.00 |
| $\ln C (-1)$ | -0.36 | 0.01 | $\ln C (-1)$ | -0.33 | 0.01 |
| $\ln W (-1)$ | 0.23 | 0.01 | $\ln \Omega (-1)$ | 0.10 | 0.08 |
| $\ln R (-1)$ | 0.10 | 0.02 | $\ln Y (-1)$ | 0.30 | 0.01 |
| Adj. R ² | 0.64 | | Adj. R ² | 0.66 | |
| DW stat. | 2.04 | | DW stat. | 1.97 | |
| <i>Elasticities:</i> | | | | | |
| e_{CW} | 0.64 | | $e_{C\Omega}$ | 0.29 | |
| e_{CR} | 0.27 | | | | |
| e_{CY} | 0.91 | | e_{CY} | 0.91 | |
| <i>Marginal effects (at sample means):</i> | | | | | |
| $\partial C/\partial W$ | 0.74 | | | | |
| $\partial C/\partial R$ | 0.44 | | | | |
| $\partial(C/Y)/\partial \Omega$ | 0.30 | | $\partial(C/Y)/\partial \Omega$ | 0.33 | |

Notes: e_{CW} , e_{CR} , e_{CY} , $e_{C\Omega}$ are the elasticities of consumption with regard to wages, profits, income and the wage share, respectively. $\partial C/\partial W$, $\partial C/\partial R$, $\partial(C/Y)/\partial \Omega$ 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. All marginal effects are calculated at the mean of the sample.

In the first equation, the long-run elasticities for wage and profit income are 0.64 and 0.27, respectively. Due to the use of logarithms, these are elasticities and have to be converted into

⁹ Both the WIFO and the IHS are applying an ECM for the consumption function.

¹⁰ Economic variables that are supposed to grow exponentially have to be used in logarithmic form in order to get stationary. See e.g. Stewart (2005: 742ff) for further discussion.

marginal effects by multiplying with the share of consumption in wages and profits, respectively. This yields marginal propensities to consume of 0.74 (for wage income) and 0.44 for profit income. The difference of these two values (0.30) is the effect of a change in functional income distribution on consumption. A redistribution of income of 1 percentage point (of GDP) from profits to wages would in the average induce additional consumption expenditures of 0.30% of GDP.

As the function is estimated in logarithmic form, the sum of the wage and profit income elasticity is the total income elasticity of consumption. Its value is 0.91 which is close to 1, the value assumed by the permanent income hypothesis. For the second equation, the long-run marginal effect of a change in income distribution is 0.33 and the long-run income elasticity of consumption expenditures is 0.91, which are almost exactly the same values as obtained through the first estimation strategy. Both the first estimation, where income distribution was included by separating income into wage and profit income, and the second, where we directly applied a distributional variable yield (almost) the same results.

In the WIFO macroeconomic model, the only explanatory variable is the disposable income of households. The IHS model is estimating consumption of durables, non-durables and services separately, all of them with disposable income as explanatory variable.¹¹ The income elasticity estimated by the WIFO is 1.12, which is slightly above our value. The IHS reports income elasticities between 0.70 and 1.54, depending on the type of consumption. Thus, the comparison of our income elasticities with the WIFO and the IHS models indicate that our estimation results are very plausible. Hein und Vogel (2007) get an effect of a rise of the wage share on consumption of -0.24% of GDP. This value is also very close to our results. However, they apply an estimation equation in differences. The results therefore are not directly comparable.

¹¹ The equation for durables additionally contains the long-term real interest rate as explaining variable.

Our estimation results imply that a change in functional income distribution is clearly affecting consumption expenditures. Adding a distributional variable to standard consumption functions is therefore providing additional information about macroeconomic consumption behaviour.

4.2 Investment

Investment usually is modelled as a function of output (Y) and the long-term real interest rate or some other measure of capital cost. In our model, profits are included as explanatory variable in the equation (see section 2). As the coefficient on profits gives the effect of profits holding total income constant, this coefficient represents the effect of a redistribution of income on investment. The explanatory variables thus are GDP, profits and the long-term real interest rate. First, the investment function was estimated as an ECM without a restriction. For the second equation, the long-run coefficient of output on investment was restricted to one. A similar restriction in the investment function is used in the WIFO model. It implies that in the long-run the investment share in output is stable.

Table 2 reports the results of the two estimations. For both equations the estimated long-run coefficients are very similar. The coefficients on the interest rate are statistically insignificant both in the short and the long run. In the first equation, the long-run coefficient on profits is also statistically insignificant. Applying the restriction in the second equation turns the coefficient significant.¹²

¹²In the estimations of the IHS the interest rate is also not statistically significant. The WIFO is using a variable for capital cost, which is calculated from the inflation rate of capital goods, the nominal interest rate and a depreciation rate. Additionally, a factor for the Austrian tax system was included. The capital cost however only have a short-run effect. Unfortunately no information is given about the statistical significance of this variable. Similarly, Wesche (2000: 18) concludes from a study with firm-level data that “the traditional interest-rate channel is negligible for Austrian enterprises”.

The long-run elasticity of investment with respect to the wage share is 0.15 for the first estimation and 0.30 for the second. These results correspond to a marginal effect of the wage share on investment of -0.08 and -0.15 (at sample means). A redistribution of income of 1 percentage point (of GDP) from profits to wages would therefore reduce investment expenditures by 0.08% or 0.15% of GDP. Due to the application of logarithms in the equations, we have to sum up the long-run coefficients on GDP and profits in order to get the total income elasticity. Both equations yield approximately the same income elasticity of 1.30.

Table 2: Regression results for investment function

| Dependent Variable: $\Delta \ln I$ | | | Dependent Variable: $\Delta \ln I$ | | |
|--|--------|-------|------------------------------------|--------|-------|
| Variable | Coeff. | Prob. | Variable | Coeff. | Prob. |
| c | -1.97 | 0.01 | c | -1.59 | 0.00 |
| $\Delta \ln Y$ | 3.46 | 0.00 | $\Delta \ln Y$ | 3.34 | 0.00 |
| $\Delta \ln R$ | -0.68 | 0.02 | $\Delta \ln R$ | -0.63 | 0.02 |
| $\Delta \ln i$ | 0.00 | 0.90 | $\Delta \ln i$ | 0.00 | 0.80 |
| $\ln I (-1)$ | -0.43 | 0.00 | $\ln I (-1)/Y(-1)$ | -0.44 | 0.00 |
| $\ln Y (-1)$ | 0.50 | 0.00 | $\ln R (-1)$ | 0.13 | 0.00 |
| $\ln R (-1)$ | 0.06 | 0.55 | $\ln i (-1)$ | 0.00 | 0.82 |
| $\ln i (-1)$ | 0.00 | 0.87 | | | |
| Adj. R ² | 0.63 | | Adj. R ² | 0.63 | |
| DW stat. | 2.11 | | DW stat. | 2.07 | |
| <i>Elasticities:</i> | | | | | |
| e_{IR} | 0.15 | | e_{IR} | 0.30 | |
| e_{IY} | 1.31 | | e_{IY} | 1.30 | |
| <i>Marginal effects (at sample means):</i> | | | | | |
| $\partial(I/Y)/\partial\Omega$ | -0.08 | | $\partial(I/Y)/\partial\Omega$ | -0.15 | |

Notes: e_{IR} , e_{IY} are the elasticities of investment with regard to profits and income, respectively. $\partial I/\partial\Omega$ is the marginal effects on investment in response to changes of the wage share. All marginal effects are calculated at the mean of the sample.

The WIFO model differentiates between investment in machinery and equipment and in construction investment (excluding housing investment). Both equations are estimated with the GDP of the private sector and capital costs as explaining variables. The IHS model also distinguishes investment in machinery and equipment and construction investment (including housing investment). The explaining variables are GDP and the long-term real interest rate.

The income elasticities estimated by the WIFO are 1 (for machinery and equipment) and 2 (for construction), where the former one is imposed by a restriction. The long-term income elasticities in the IHS model are 1.39 for machinery and equipment and 0.79 for construction investment. All these values are similar to our results. Our estimations therefore seem to give plausible results.

Hein und Vogel (2007) estimate investment as a function of the profit share and GDP in first differences. Yet, the coefficient on the profit share is not statistically significant. For the income elasticity they obtain a value of 1.79. Their results therefore are similar to our first equation. However, imposing a restriction following the WIFO model, we get a statistically significant coefficient on profits.

As for consumption, a distributional variable seems to affect investment. Though, the effects of a change of functional income distribution on investment are considerably smaller than on consumption. Furthermore, estimating the equation without restriction gives statistically insignificant coefficients for profits. The results for the distributional effect on investment therefore should be treated with caution. Although they will be included in the calculation of the overall effect (see section 4.4), the values reported above have to be considered as upper bound estimates.

4.3 Prices

For the effects on consumption expenditures and investment, it is not important whether a change in income distribution is associated with a change in the price level. However, exports and imports depend on relative prices. In order to identify effects of a shift in functional income distribution on net exports, the price effects of this shift have to be identified in a first step. Typically prices are explained by unit labor costs and import prices. This price equation permits the calculation of a rise in real unit labor costs (and thus the wage share) on prices.

The resultant rise in prices entails a deterioration of international competitiveness and therefore affects net exports. This second step of the calculation is subject of the next section. Here the price effects will be analyzed.

Two regressions for prices are estimated. The first one estimates export prices (Px) as a function of domestic prices (P) and import prices (Pm). In the second one domestic prices are explained by nominal unit labor costs (ULC), import prices and domestic GDP (Table 3). Both our estimations were performed in difference form after ECM specifications proved unsuccessful. The coefficients of both estimations are statistically significant (with the exception of GDP in the price equation) and have the expected signs.

Table 3: Regression results for price functions

| Dependent Variable: $\Delta \ln P_x$ | | | Dependent Variable: $\Delta \ln P$ | | |
|--------------------------------------|--------|-------|------------------------------------|--------|-------|
| Variable | Coeff. | Prob. | Variable | Coeff. | Prob. |
| C | 0.00 | 0.40 | c | 0.00 | 0.08 |
| $\Delta \ln P_m$ | 0.57 | 0.00 | $\Delta \ln Y$ | 0.07 | 0.16 |
| $\Delta \ln P$ | 0.33 | 0.01 | $\Delta \ln P_m$ | 0.15 | 0.00 |
| AR(1) | 0.15 | 0.36 | $\Delta \ln ULC$ | 0.34 | 0.00 |
| | | | $\Delta \ln P(-1)$ | 0.35 | 0.00 |
| Adj. R ² | 0.81 | | Adj. R ² | 0.92 | |
| DW stat. | 1.79 | | DW stat. | 2.13 | |

The price elasticity (with respect to domestic prices) of export prices is 0.33, the import price elasticity is 0.57 (Table 3, left side). The equation for domestic prices is estimated as a partial-adjustment-model with the lagged prices as additional explaining variable. The resultant long-run unit labour costs of domestic prices is 0.52 $[0.34/(1-0.35)]$. To obtain the unit labor costs elasticity of export prices, the price elasticity of export prices is multiplied by this value. We get a value of 0.18.

In the WIFO model export prices are estimated directly as a function of unit labor costs. Domestic prices depend on unit labor costs, import prices and the output gap. Both equations are estimated in differences. The IHS estimated various price equations for consumption and investment prices as functions of unit labor costs, import prices and the output gap. All

equations are estimated in differences. Export prices are taken as exogenous. The WIFO gets a unit labor costs elasticity of exports of 0.23, which is rather close to our result (0.18). The import price elasticity of export prices of the WIFO is 0.45. This value also is not far from the one obtained by our estimations (0.57).

The elasticities estimated by the domestic price equation are (partly) also very similar. For the unit labor costs elasticity we get a value of 0.52, where the WIFO is estimating a coefficient of 0.57. For the import price elasticity of domestic prices however we get different values. The result of our estimations is 0.22 $[0.15/(1-0.35)]$, whereas the WIFO gets a value of 0.54. Because the IHS is taking export prices as exogenous, we cannot compare results for this equation. For domestic prices the IHS gets a unit labor costs elasticity of 0.47 and an import price elasticity of 0.31. Both values are in the same range as our estimations. The results of the estimations of the price functions therefore seem plausible.

The elasticity of domestic prices with respect to nominal unit labor costs calculated above is 0.52. Thus, an increase in nominal unit labor costs by 1% increases domestic prices by 0.52%. The difference between the rise in nominal unit labor costs and prices by definition is the resultant change in real unit labor costs. In order to get the increase in domestic prices arising from a rise of real unit labor costs of 1%, which is of interest here, nominal unit labor costs have to rise by 2.10% $[1/(1-0.52)]$. Prices at the same time rise by 1.10% $[0.52*2.10]$. The elasticity of domestic prices with respect to a rise in real unit labor costs therefore is 1.10. This calculation is shown in columns 1 and 2 of Table 4. In order to obtain the real unit labor costs elasticity of export prices (which will enter the calculation of the net exports effect in the following section) this value is multiplied by the price elasticity of export prices (column 3). The result is presented in column 4. The real unit labor costs elasticity of export prices is 0.36.

Table 4: Price elasticities

| 1 | 2 | 3 | 4 |
|------------|-------------|-----------|--------------|
| e_{PULC} | e_{PRULC} | e_{PxP} | e_{PxRULC} |
| 0.52 | 1.1 | 0.33 | 0.36 |

Note: Column 1 and 3 estimates from Table 3. Column 2: e_{PRULC} is calculated as e_{PULC} (column 2) divided by $1 - e_{PULC}$. Column 4: e_{PxRULC} is the real unit labor costs elasticity of export prices.

4.4 Net exports

Exports are estimated as a function of export prices relative to an index of competitor prices on export markets (P_{xc}). As these countries represent the main trading partners of Austria, the GDP of the Euro 12-countries was include in the equation in order to represent foreign demand. Foreign prices are represented by the price deflator for competitors' prices already in Euro, thus the (nominal) exchange rate is not included in the estimation. As there is no indication of cointegration, exports are estimated in first differences.

Imports are also estimated in difference form. The explanatory variables are GDP and export prices relative to import prices. The use of export prices is motivated by the fact that in the GDP deflator prices for non-tradable goods and services are included, which are not relevant for imports. The export price deflator therefore is a better representative for competitors' prices on import markets.

Table 5 presents the results of the estimations for exports and imports. All relevant coefficients are statistically significant and have the expected signs. The price elasticity of exports is -0.28, the elasticity with respect to foreign GDP is 1.33. For imports the price elasticity is 0.79, which is remarkably higher. The demand elasticity of imports is 2.00.

Table 5: Regression results for export and import functions

| Dependent Variable: $\Delta \ln X$ | | | Dependent Variable: $\Delta \ln M$ | | |
|------------------------------------|--------|-------|------------------------------------|--------|-------|
| Variable | Coeff. | Prob. | Variable | Coeff. | Prob. |
| c | 0.02 | 0.02 | c | 0.00 | 0.97 |
| $\Delta \ln Y_{EU12}$ | 1.33 | 0.00 | $\Delta \ln Y$ | 2.00 | 0.00 |
| $\Delta \ln P_x/P_{xc}$ | -0.28 | 0.00 | $\Delta \ln P_x(-1)/P_m(-1)$ | 0.79 | 0.03 |
| AR(1) | 0.09 | 0.67 | AR (1) | -0.15 | 0.35 |
| Adj. R ² | 0.46 | | Adj. R ² | 0.63 | |
| DW stat. | 1.92 | | DW stat. | 2.10 | |

Export and import functions of the WIFO and IHS models also depend (among other variables) on relative prices. The WIFO export equation uses export prices relative to a world price deflator and weighted GDP of the Austrian trade partners. The equation is estimated as an ECM, though the price variables are not included in the error correction term. In the long run, therefore prices would not influence export performance. The IHS is estimating a difference model with export prices relative to import prices and demand of Austrian export markets as explaining variables. The coefficients of the WIFO model are -0.28 for the price elasticity and 2.4 for the elasticity with respect to foreign demand. Thus, the price elasticity estimated by the WIFO is close to our results. The higher value for the coefficient on foreign demand is probably a result of the use of a different variable. The IHS gets a price elasticity of -0.24 and an elasticity with respect to foreign demand of 1.12. Both are similar to our results.

Both WIFO and IHS use the ratio of imports and the sum of demand components weighted by a constant import share. The explanatory variables in the WIFO model are the import prices relative to domestic prices. The IHS uses import prices relative to export prices. The explanatory variable for relative prices in our equation thus is the same as in the IHS model. The price elasticity of imports is 0.28¹³ in the WIFO model it and 0.42 for the IHS model.

¹³ This is only the short run value of the WIFO equation. Since a partial adjustment model is applied, the short run effect has to be corrected in order to determine the long run effect. However, this would increase the value to 1.91, which we consider implausibly high.

The calculation of the effect of a shift in income distribution on exports and imports involves several steps (which are presented in table 6). The elasticity of exports and imports with respect to a rise of 1%-point in real unit labor costs includes the price elasticities and the effect of real unit labour costs on prices. As explained in section 4.3, we derive from the equation for prices that an increase of real unit labor costs by 1% increases export prices by 0.36%. This value shows up in column 1. By multiplying with the estimated export price elasticity of exports and imports (column 2) we get the real unit labor costs elasticity of exports and imports, respectively (column 3). This value has to be transformed by dividing through the average of real unit labor costs (column 4) in order to get the semi-elasticity of exports and imports with respect to real unit labor costs, which by definition is the same as the effects of changes in the wage share. As a result, we get the elasticity of exports and imports with respect to the wage share, which is -0.20 (column 5).

Table 6: Export and import effects

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------------|----------------|------------|-------------|----------|---------------|-------|------------------|
| Exports | $e_{P_x RULC}$ | e_{XP_x} | e_{XRULC} | $1/RULC$ | $e_{X\Omega}$ | X/Y | $d(X/Y)/d\Omega$ |
| X/Y 2005 | 0.36 | -0.28 | -0.10 | 1.97 | -0.20 | 0.53 | -0.11 |
| X/Y avg. | 0.36 | -0.28 | -0.10 | 1.97 | -0.20 | 0.29 | -0.06 |
| X/Y 1960 | 0.36 | -0.28 | -0.10 | 1.97 | -0.20 | 0.13 | -0.03 |
| Imports | $e_{P_x RULC}$ | e_{MP_x} | e_{MRULC} | $1/RULC$ | $e_{M\Omega}$ | M/Y | $d(M/Y)/d\Omega$ |
| X/Y 2005 | 0.36 | 0.79 | 0.28 | 1.97 | 0.57 | 0.49 | 0.28 |
| X/Y avg. | 0.36 | 0.79 | 0.33 | 1.97 | 0.57 | 0.29 | 0.16 |
| X/Y avg. | 0.36 | 0.79 | 0.33 | 1.97 | 0.57 | 0.14 | 0.08 |

Note: Column 1 from Table 4. Column 2 estimates from Table 5. Column 3: e_{XRULC} is calculated as $e_{P_x RULC}$ (column 1) multiplied by e_{XP_x} (column 2). Column 5: $e_{X\Omega}$ and $e_{M\Omega}$ are the wage share (semi-)elasticities of exports and imports, respectively, obtained by transforming column 3 through the reciprocal value of real unit labor costs (column 4). Column 7: Partial effect of a rise of the wage share on exports and imports.

This elasticity has to be transformed into marginal effects. As export and import shares display a clear trend due to globalization, the transformation of elasticities into marginal effects yields different results according to the point in time where these effects are evaluated. We therefore report values calculated at the beginning (1960), at the mean and at the end

(2005) of the sample. An increase in the wage share of 1%-point thus leads to a decrease in exports of 0.11% (2005), 0.06% (mean) and 0.03% (1960) of GDP. The corresponding values for imports are 0.28%, 0.16% and 0.08% of GDP. The effect of an increase in the wage share of 1%-point on net exports is therefore -0.39% (2005), -0.22% (mean) and 0.11% (1960) of GDP. The difference between the two values at the beginning and the end of the sample reflects the increasing importance of international trade and globalization. The sum of the export and import effect gives the total effect of an increase in the wage share by 1%-point on net exports (export effect minus import effect). The results for net exports are displayed in table 7 in the following section.

Hein and Vogel (2007) directly estimate net exports explained by the profit share, domestic GDP and GDP of the Euro12-area. They get a net exports effect of a rise in the wage share by 1%-point of -0.34% of GDP which lies between our results at the mean (-0.22) and the end (-0.39) of the sample.

4.5 Total effects

Table 7 puts together the partial effects presented above. Adding these up gives the private excess demand resulting from a one percentage point increase in the wage share. The results of the net exports effect calculated at different points in time are reported in different columns. For consistency, consumption and investment effects are also calculated with the values at the end, the mean and the beginning of the sample. The positive effect of an increase in the wage share on consumption is reduced from 0.48% of GDP in 1960 to 0.38% in 2005. This is due to both a fall in the consumption share and the wage share.¹⁴ The investment effect is -0.11% (1960) and -0.15% of GDP in 2005, however it is not very robust. The positive consumption effect is substantially larger than the negative investment effect. Thus,

¹⁴ The average effect is smaller than for 2005 because the wage share rose in the 1970s and fell afterwards.

the domestic sector of the economy is clearly wage-led. The results suggest that an increase of 1%-point of the wage share leads to an increase of domestic demand of 0.37% of GDP in 1960 and 0.21% of GDP in 2005. At the mean of the sample, the effect on domestic (private excess) demand is 0.16% of GDP.

Table 7: Total effects on private excess demand

| | shares 2005 | shares mean | shares 1960 |
|------------------------|------------------------|------------------------|------------------------|
| Consumption | 0.36 | 0.31 | 0.48 |
| Investment | -0.15 | -0.15 | -0.11 |
| <i>Domestic effect</i> | 0.21 | 0.16 | 0.37 |
| Net exports | -0.39 | -0.22 | -0.11 |
| Total effect | -0.18 | -0.06 | 0.26 |

The effect of an increase of the wage share on net exports is 0.11% of GDP in 1960, which is much lower than the effect on domestic demand. At the beginning of the sample thus the overall effect is clearly positive (0.26%) and the demand regime is wage-led. In 2005 however, the net exports effect is higher than the domestic effect. The total private excess demand effect is -0.18% of GDP and the demand regime turns profit-led.

To get the total effects of a shift in income distribution on equilibrium demand, the effects on excess demand have to be adjusted by the multiplier (see equation 3). The focus of our analysis has been on the effects of shifts in functional income distribution. Consequently the econometric specifications have been chosen such that the distributional effects are plausible. The income elasticities have not received similar attention. In particular the income elasticity of imports is rather high and probably picks up effects of an (exogenous) increase in the international division of labor. As these elasticities critically enter the calculation of the multiplier, the results have to be interpreted with great caution. The presentation of the

multiplier here thus is for completeness rather than for realism. The multiplier and the corresponding results for total output are presented in table 8.

Table 8: Total effects on (equilibrium) output

| | Shares 2005 | Shares mean | Shares 1960 |
|---------------------|------------------------|------------------------|------------------------|
| Demand effect | -0.18 | -0.06 | 0.26 |
| Multiplier | 0.83 | 1.25 | 1.87 |
| Total effect | -0.15 | -0.09 | 0.50 |

The multiplier consists of partial effects of changes in income on consumption, investment and imports. Tables 1, 2 and 4 contain the corresponding coefficient estimates. Both the income elasticity of consumption and investment are close to one. The income elasticity of imports is 2, which probably also picks up the effects of an (exogenous) increase in the international division of labor. Again, the coefficients represent elasticities and have to be converted into partial effects. The points in time at which the elasticities are converted therefore make a big difference. At the beginning of the sample we get a multiplier of 1.87. The positive demand effect therefore is enlarged up to 0.50. The total effect of a rise in the wage share of 1%-point on output is 0.50% of GDP. At the mean of the sample, the slightly negative demand effect is multiplied by 1.25. The resulting total effect is -0.09. In the year 2005, due to the increasing import share, the multiplier is below one. Thus, the (negative) demand effect is slightly diminished. The resulting total effect is -0.15% of GDP. However, these values have to be considered as less reliable than the private excess demands calculated in Table 7.

Summing up, the demand regime in Austria is clearly wage-led in the 1960s and turns into profit-led in 2005 with a private excess demand effect of around -0.18.

5 Conclusion

The paper has investigated how changes in the wage share affect aggregate demand in Austria. Behavioural equations for consumption, investment and international trade, which included a term for functional income distribution, but are otherwise comparable with standard macroeconometric models for Austria have been estimated. Three key findings have emerged. First, domestic component of the demand regime is wage led. The effect of a change in wage share on consumption is much greater than its effect of investment. Second, including international trade, the demand regime turns profit-led. This is mostly due to trade, which in a small open economy plays an important role. Thirdly, the role of the international demand component has increased over time, reflecting increasing international division of labor and globalization.

As the overall demand regime in Austria is profit led, it is tempting to conclude that the fall in the wage share has positively contributed to growth. However, the implications of our analysis are in fact more complex. A decline in the wage share will increase demand *ceteris paribus*, that is with world market prices being constant. It will only increase demand as far as it leads to an increase in competitiveness. In our context the crucial questions is how unit labor costs, and ultimately wage shares in the main trading partners develop. Indeed wage shares have sharply fallen all over Europe. Austria's wage moderation thus has not fully translated in an increase in competitiveness. Figure 2 shows the development of the wage share and a price measure of competitiveness.¹⁵ While there clearly is a correlation of the wage share and competitiveness, the latter also crucially depends on wage (and productivity) developments abroad and on nominal exchange rates.

¹⁵ Nothing hinges on the particular measure of competitiveness that has been taken from the AMECO database for convenience. Other measures would broadly show a similar pattern.

Figure 2: Wage share and competitiveness in Austria



Note. The wage share is the adjusted wage share at factor costs; competitiveness is the nominal unit labor costs, performance relative to the EU15 with double export weights. Both are standardized 1979 = 100. Source: AMECO database

As exchange rates have been irrevocably fixed in the Euro system, wage moderation has become a more effective means of increasing competitiveness. However, our analysis highlights that wage moderation is a potentially dangerous policy instrument. While any small country can stimulate its economy by means of wage moderation, this will only work if its trade partners do not follow a similar strategy. In the period under investigation, this latter has been the case. Thus Austria’s wage moderation thus has not fully translated in an increase in competitiveness.

EU member states predominantly trade among each other. The EU as a whole is a relatively closed economy. A (real) wage moderation at the EU level would therefore have only a small expansionary effects via net exports, but the full negative effects of its wage-led domestic sector. Indeed Stockhammer, Onaran and Ederer (2007) find that a 1%-point

decrease in the wage share has negative demand effect of around 0.2%-points of GDP in the Euro area.

It therefore seems that wage policy in the Euro area can be characterized as a prisoners' dilemma situation. While many member states will individually exhibit profit-led demand regimes, collectively they form a wage-led demand regime. While for each country it may be expansionary to exercise wage moderation (assuming constant wages abroad), wage moderation in all countries will have a contractionary effect. This is likely to generate a downward bias in wage settlements if wages are negotiated nationally. A coordination of wage bargaining across the Euro area (or the EU in general) therefore seems desirable.

The approach taken in this paper has several limitations that should be addressed in future research. While these limitations are rather obvious, their fixes are not. Firstly, functional income distribution has been taken as exogenously given. A full model would endogenize the wage shares. Secondly, the paper has focused on the private sector. A full model would include the state sector, which is difficult because it requires assigning various taxes to wage and profit incomes. Thirdly, the paper has only analyzed the demand side of the economy. A full model would explicitly model the supply side. While standard production functions fit uneasily with Post Keynesian models, because the economy will only be at full capacity utilization by coincidence, there is no reason to assume that productivity growth is exogenous to wage growth.

6 References

- Baumgartner, J, Breuss F, Kaniowski, S, 2005. WIFO-Macromod – An econometric model of the Austrian economy. In: OeNB (ed): Macroeconomic Models and Forecasts for Austria. Proceedings of OeNB Workshops No. 5
- Bhaduri, Amit, Marglin, Stephen, 1990. Unemployment and the Real Wage: The Economic Basis for Contesting Political Ideologies. *Cambridge Journal of Economics*, 14: 375-93
- Blanchard, Olivier (2006). *Macroeconomics*, 4th Edition. Upper Saddle River, NJ: Prentice Hall
- Blecker, R., 1989. International Competition, Income Distribution and Economic Growth. *CJE* 13: 395-412
- Blecker, R., 1999. Kaleckian macromodels for open economies, in Deprez, J. and Harvey, J.T (eds): *Foundations of international economics: post Keynesian perspectives*. Routledge, London, New York.
- Blecker, R., 1999. Kaleckian macromodels for open economies, in Deprez, J. and Harvey, J.T (eds): *Foundations of international economics: post Keynesian perspectives*. Routledge, London, New York.
- Blecker, Robert, 2002. Distribution, demand and growth in neo-Kaleckian macro-models. in: Setterfield (ed): *The economics of demand-led growth*. Cheltenham, UK: Edward Elgar
- Bowles, S, Boyer, R, 1995. Wages, aggregate demand, and employment in an open economy: an empirical investigation. In: G Epstein and H Gintis (eds): *Macroeconomic policy after the conservative era*. Studies in investment, saving and finance. Cambridge: University Press
- Breuss, Fritz, 2007. Globalization, EU enlargement and income distribution. Wifo working paper 296/2007
- Charemza, W, Deadman, D, 1997. *New Directions in Econometric Practice*. Edward Elgar, Cheltenham.
- Ederer, S, Stockhammer, E, 2007. Wages and aggregate demand in France: An empirical investigation. Hein, E, Truger, A (eds): *Money, distribution, and economic policy – alternatives to orthodox macroeconomics*. Cheltenham: Edward Elgar
- Fazzari, S, Mott, T, 1986. The investment theories of Kalecki and Keynes: an empirical study of firm data, 1970-1982. *Journal of Post Keynesian Economics* 9, 2: 171-187
- Fenz, G, Spitzer, M. 2005. AQM The Austria Quarterly Model of the Oesterreichische Nationalbank. In: OeNB (ed): *Macroeconomic Models and Forecasts for Austria*. Proceedings of OeNB Workshops No. 5
- Flassbeck, H, Spiecker, F, 2005. Die deutsche Lohnpolitik sprengt die Europäische Währungsunion. *WSI Mitteilungen* 12/2005, 707-13
- Gordon, David, 1995. Growth distribution, and the rules of the game: social structuralist macro foundations for a democratic economic policy. In: G Epstein and H Gintis (eds):

- Macroeconomic policy after the conservative era. Studies in investment, saving and finance. Cambridge: University Press
- Gordon, David, 1995. Putting the horse (back) before the cart: disentangling the macro relationship between investment and saving. In: G Epstein and H Gintis (eds): Macroeconomic policy after the conservative era. Studies in investment, saving and finance. Cambridge: University Press
- Hatzius, Jan, 2000. Foreign direct investment and factor demand elasticities. *European Economic Review* 44 (1), 77-143
- Hein, E, and Ochsen, C., 2003. Regimes of interest rates, income shares, savings, and investment: a Kaleckian model and empirical estimations for some advanced OECD-economies, in: *Metroeconomica*, Vol. 54, 404-433
- Hein, E, Krämer, H, 1997. Income shares and capital formation: patterns of recent developments. *Journal of Income Distribution* 7, 1: 5-28
- Hein, E, Vogel, L, 2007. Distribution and growth reconsidered – empirical results for Austria, France, Germany, the Netherlands, the UK and the USA. IMK working paper 3/2007
- Hubbard, R, 1998. Capital market imperfections and investment. *Journal of Economic Literature* 36: 193-225
- IMF, 2007. The globalization of labor. Chapter 5 of World Economics Outlook April 2007. Washington: IMF
- Kaldor, Nicholas, 1956. Alternative Theories of Distribution. *Review of Economic Studies* 23, 2: 83-100
- Kaldor, Nicholas, 1957. A model of economic growth. *Economic Journal* LXVII: 591-624
- Kalecki, Michal, 1954. Theory of Economic Dynamics. Reprinted in J. Osiatynski (ed): *Collected Works of Michal Kalecki*, Vol. 1, Oxford: Clarendon Press
- Kalecki, Michal, 1954. Theory of Economic Dynamics. Reprinted in J. Osiatynski (ed): *Collected Works of Michal Kalecki*, Vol. 1, Oxford: Clarendon Press
- Kalecki, Michal, 1971. *Selected Essays on the Dynamics of the Capitalist Economy*. Cambridge
- Mankiw, Nicholas Gregory (2006). *Macroeconomics*. New York, 6th edition. NY: Worth
- Marginson, P, Sisson, K (2004). *European integration and industrial relations. Multi-level governance in the making*. Houndsmill: Palgrave MacMillan
- Marglin, S, Bhaduri, A, 1990. Profit Squeeze and Keynesian Theory. In: S. Marglin and J. Schor (eds): *The Golden Age of Capitalism. Reinterpreting the Postwar Experience*. Oxford: Clarendon
- Marterbauer, M; Kaniowski, S; Kratena, K; Wüger, M (2006): *WIFO-Weißbuch: Mehr Beschäftigung durch Wachstum auf Basis von Innovation und Qualifikation. Teilstudie 11: Maßnahmen zur Belebung der privaten Inlandsnachfrage*.
- Marterbauer, M; Walterskirchen, E., (2003). Bestimmungsgründe der Lohnquote und realen Lohnstückkosten. *Wifo-Monatsberichte* 2/03, 151-59
- Marx, Karl, 1976. *Capital. A Critique of Political Economy Volume One*. Penguin Books
- Naastepad, R, Storm, S (2006/7), OECD demand regimes (1960-2000), *Journal of Post-Keynesian Economics* 29 (2), 213-248

- Naastepad, Ro (2006). Technology, demand and distribution: a cumulative growth model with an application to the Dutch productivity slowdown. *Cambridge Journal of Economics* 30 (3) 403-434
- OECD, 2007 OECD workers in the global economy: increasingly vulnerable? Chapter 3 of OECD Employment Outlook 2007
- Palley, Thomas, 2006. Currency Unions, the Phillips Curve, and Stabilization Policy: Some Suggestions for Europe. *Intervention* 3 (2),351-370
- Ricardo, David, 1951. On the principles of political economy and taxation. Edited by Piero Sraffa. Cambridge University Press
- Robinson, Joan, 1956. The accumulation of capital. London: Macmillan
- Robinson, Joan, 1962. Essays in the theory of economic growth. London: Macmillan
- Rodrik, Dani, 1997. Has globalization gone too far? Washington: Institute for International Economics
- Romer, David, 2006. Advanced macroeconomics. 3rd edition. Boston: McGraw-Hill
- Rowthorn, R, 1981. Demand, real wages and economic growth. *Thames Papers in Political Economy*. Autumn 1-39, reprinted in *Studi Economici* 1982, vol. 18 3-54 and also in Sawyer (ed): Post-Keynesian Economics
- Schulten, Thorsten (2004). Solidarische Lohnpolitik in Europa. Zur Politischen Ökonomie der Gewerkschaften. Hamburg: VSA-Verlag
- Stewart, Kenneth (2005): Introduction to Applied Econometrics. Belmont: Brooks/Cole Thomson Learning.
- Stiglitz, J, Weiss, A, 1981. Credit rationing in markets with imperfect competition. *American Economic Review* 71: 393-410
- Stockhammer, E, Onaran, Ö, Ederer, S. 2007. Functional income distribution and aggregate demand in the Euro area. Vienna University of Economics & B.A. Working Paper No. 102, Feb 2007
- Stockhammer, E. and O. Onaran (2004), 'Accumulation, Distribution and Employment: A Structural VAR Approach to a Kaleckian Macro-model' *Structural Change and Economic Dynamics* 15 (4), 421-47
- Visser, Jelle, 2004. Patterns and variations in European industrial relations. Chapter 1 in: European Commission: Industrial relations in Europe 2004. Luxembourg: European Communities

Appendix

Table A.1: Variable definitions

| Notation | OECD Notation | Description |
|----------|---------------|--|
| Ω | - | Wage share |
| 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 |
| P_{XC} | PXC | Competitors prices on export market |
| R | - | Gross operating surplus, real, deflated by GDP deflator |
| RULC | - | Real unit labor costs |
| ULC | ULC | Nominal unit labor costs |
| W | - | Compensation of employees real, deflated by GDP deflator |
| X | XGSV | Exports, real |
| Y | GDPV | GDP, real |
| Y_EU | GDPV | GDP, Euro 12-countries, real |

Table A.2: Unit root tests

| Variable | Levels | | | | First Differences | | | |
|---------------------|--------------------|------|---------------|--------------|--------------------|------|---------------|--------------|
| | Constant/ Trend | Lags | Test stat. | Signifikance | Constant/ Trend | Lags | Test stat. | Signifikance |
| ln C | c, t | 0 | -1.302 | - | c | 0 | -4.774 | *** |
| ln W | c, t | 1 | -1.090 | - | c | 0 | -2.501 | ** |
| ln R | c, t | 0 | -3.328 | ** | c | 1 | -7.138 | *** |
| ln I | c, t | 0 | -2.612 | - | c | 0 | -6.271 | *** |
| ln Y | c, t | 0 | -1.643 | - | c | 0 | -5.086 | *** |
| ln Ω | c | 0 | -2.239 | ** | c | 0 | -6.253 | *** |
| i | c | 0 | -2.395 | ** | c | 0 | -7.393 | *** |
| ln X | c, t | 0 | -1.577 | - | c | 0 | -4.998 | *** |
| ln Y_EU12 | c, t | 1 | -2.350 | - | c | 0 | -3.866 | *** |
| ln P_X/P_{XC} | c | 0 | -1.621 | * | c | 1 | -4.426 | *** |
| ln M | c, t | 0 | -1.731 | - | c | 0 | -6.136 | *** |
| ln P/P _m | c | 0 | -1.360 | - | c | 1 | -5.916 | *** |
| ln ULC | c, t | 0 | 0.980 | - | c | 0 | -3.225 | *** |
| ln P_X | c, t | 1 | -0.649 | - | c | 0 | -3.430 | *** |
| ln P | c, t | 1 | -1.006 | - | c | 0 | -1.858 | * |
| ln P _m | c, t | 0 | -0.169 | - | c | 0 | -4.181 | *** |

Notes: * denotes statistical significance at the 10% level, ** at the 5% level, *** at the 1% level. Critical values according to Charemza and Deadman (1997).

Table A.3: Cointegration tests

| Consumption function | | | |
|-----------------------------|----------------|------------|--------------|
| Dep. variable | Expl. variable | Test Stat. | Signifikance |
| C | W, R | -3.333 | - |
| C | Y, Ω | -2.962 | - |
| Investment function | | | |
| Dep. variable | Expl. variable | Test Stat. | Signifikance |
| I | Y, R | -3.128 | - |

Notes: * denotes statistical significance at the 10% level, ** at the 5% level, *** at the 1% level. Critical values according to Charemza and Deadman (1997).

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