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Private Consumption and Cyclical Asymmetries in the Euro Area

Experience after the establishment of EMU shows that the behaviour of private consumers differs considerably among member countries and that average and marginal propensities to consume are fairly heterogeneous. In particular, there are clear differences between Germany and the rest of the euro area. These asymmetric consumption functions may be responsible for cyclical divergences within the currency area. The following paper presents an econometric analysis of the available data.

Private consumption is the dominant component of aggregate demand in all member countries of the euro area. The analysis and forecast of cyclical developments therefore require a deeper understanding of the determinants and the dynamic behaviour of private consumption. This applies not only to the aggregate level of the euro area. Asymmetric consumption functions across member countries may be responsible for cyclical divergences within the currency area. As a further consequence, the common monetary stance by the European Central Bank (ECB) incurs different macroeconomic responses across member countries within the union. This may lead to problems in the process of monetary policy decision-making as the common union-wide nominal interest rate may no longer suit the cyclical conditions in all member countries.

Against this background, this paper estimates the macroeconomic consumption functions in the euro area – at the aggregate level as well as at individual country levels. Particular attention is devoted to differences between Germany on the one hand and the group of remaining euro area member countries on the other. More than a decade after the establishment of the Economic and Monetary Union (EMU), sufficient data allow for a detailed econometric investigation.[1] Furthermore, the impact of the recent international financial and economic crisis on the macroeconomic consumption functions in the euro area is analysed.

The list of previous empirical evidence is surprisingly short, in particular with respect to the evidence for individual member countries or member country groups. Empirical analyses typically focus on aggregate consumption functions for the euro area and investigate whether changes in financial or housing assets affect private consumption.[2] Country-specific consumption patterns have not received much attention. This is somewhat surprising, as preliminary empirical evidence shows that Germany and the group of other euro area member countries differ perceptibly in their consumption behaviour. In their 2008/09 report, the German Council of Economic Experts identified considerable differences between Germany

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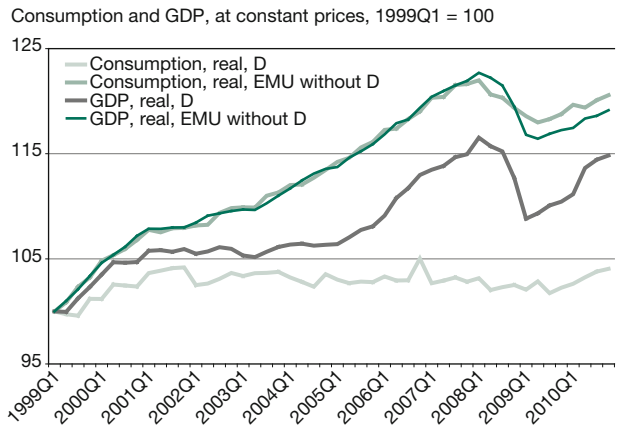
1 This paper does not investigate the importance of different commodity groups in the national consumption baskets within the euro area. The different country-specific weights of commodity groups in the harmonised index of consumer prices suggest that this is also an important source of cross-country heterogeneity in consumer behaviour in the euro area, in particular in its sectoral impact. However, sectoral asymmetries are beyond the scope of the present investigation.

2 See, for example: F. Skudelny: Euro Area Private Consumption: Is there a Role for Housing Wealth Effects, ECB Working Paper No. 1057, Frankfurt am Main 2009; and R.M. Sousa: Wealth Effects on Consumption: Evidence from the Euro Area, in: Banks and Bank Systems, Vol. 5, No. 2, 2010, pp. 70-78. Using panel econometric methods, Dreger and Reimers investigate the properties of the macroeconomic consumption functions in the euro area and focus on the importance of common versus country-specific factors. However, they also include in their analysis some countries that do not belong to the euro area. This limits the comparability of the results. See C. Dreger, H.-E. Reimers: The Long Run Relationship between Private Consumption and Wealth: Common and Idiosyncratic Effects, forthcoming in: Portuguese Economic Journal, 2012.

Figure 1
Output and Consumption in Germany and the Euro Area



Source: Data IFS; own calculations.

and the rest of the EMU. Figure 1 illustrates these differences with respect to the developments of output and private consumption after the establishment of the EMU. In direct comparison, German growth was relatively weak in the early years of the monetary union but strengthened considerably in the second half of the last decade. Real private consumption in Germany remained basically unchanged for most of the period and effectively decoupled from output developments from 2005 onwards. In the other euro area countries, in contrast, both consumption and output rose at a similar pace.

The development in the context and aftermath of the international financial and economic crisis of 2008/09 also differs. While the crisis initially led to a stronger decline in German output, the German economy has performed much better than the rest of the euro area afterwards. The level of private consumption remained remarkably robust in this period. In the other euro area countries, in contrast, private consumption and output show a similar pattern over time, whereby consumption displays somewhat lower volatility. Overall and based on an initial approximation, Germany and the other EMU member countries have shown very different behaviour since the establishment of the EMU.

In Germany, private consumption has been quite weak relative to GDP, and private savings have been relatively high by international standards. These intra-union differences in consumption and savings behaviour contribute to imbalances in the balance of payments within the euro area. While other indicators such as unit labour costs and price competitiveness surely also play a role, it is likely that asymmetric consumption and savings behaviour contributed to imbalances within the euro area. Rebalancing within the euro area, i.e. reducing structural imbalances between export-led economies with current account surpluses (such as Germany) and economies with current account deficits (Italy, Spain, Greece, Portugal and Ireland) also requires an understanding of cross-country differences in private consumption and savings behaviour.

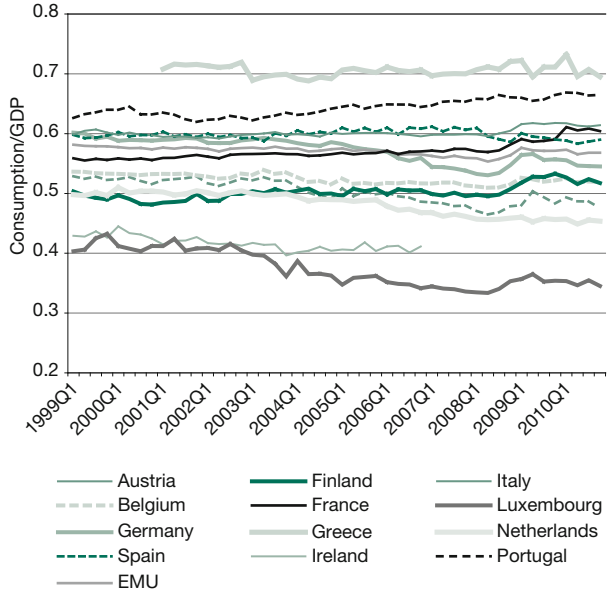
Data and Descriptive Statistics

We use quarterly seasonally adjusted data from the IMF International Financial Statistics. Consumption is measured at constant prices as real private consumption of households. Income is measured by using real GDP at constant prices, using the same base year 2000. Greece entered the EMU only in 2001, and thus we only have data from 2001 onwards. Time series for Ireland were only available up to 2007. We thus exclude both Greece and Ireland from the euro area aggregates in order to prevent discontinuities in the aggregate time series. In general, it would be preferable to estimate alternatively the relationship between consumption and *disposable household* income. Unfortunately, internationally comparable data on private disposable income are not readily available.

Figure 2 shows that average consumption shares differ substantially across the euro area. While Greece consumes about 70% of its GDP, Irish consumption amounts on average to only 40% of its GDP. Most countries, including Germany, have a consumption share between 50 and 60%. The evolution of the consumption share also differs: many countries, such as Luxembourg, the Netherlands, Austria and Germany, experience decreasing shares of consumption in GDP, whereas countries like Portugal show a growing proportion of GDP being spent on consumption. Figure 2 also reveals that consumption shares within the EMU do not converge but rather seem to diverge over time. The same holds if we look at the maximum and minimum consumption shares. Even though the consumption share was nearly constant at the aggregate EMU level, the maximum and minimum shares widen, especially at the end of the time horizon.

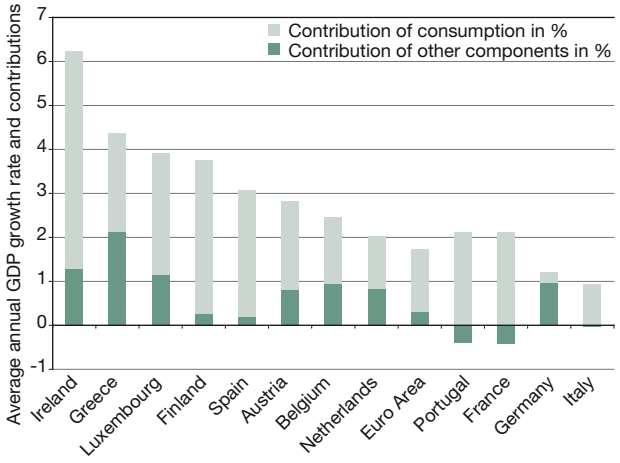
The differences in average consumption shares suggest that the contributions of private consumption to demand and output growth also differ across the euro area member countries. Figure 3 shows the country-specific growth performance in the euro area in the period before the financial crisis (1999 to mid-2008). Bearing in mind that these differences are based on average yearly growth rates over a longer time span, the differences are consid-

Figure 2
Contribution of Private Consumption to GDP in the Euro Area Countries



Source: Data IFS; own calculations.

Figure 3
Average Consumption Shares in Euro Area Countries



Source: Data IFS; own calculations.

erable. It also documents that German growth was below the average euro area growth during this period. We also display the partial contribution of private consumption to output growth on the basis of the so-called Lundberg components. The contribution of each demand component is computed as the product of the growth of the respective demand component weighted by the share of this component in aggregate output.

In Germany, private consumption made only a small contribution to growth while, looking at the other demand components, it can be shown that export performance has been the main engine of growth. In contrast, in the other euro area countries, the importance of private consumption is typically much higher. This is particularly true for Ireland but also for Spain. This again underlines the differences between Germany and the other euro area countries and further motivates our more detailed econometric investigation below.

Econometric Specification and Results

Tests of the relationship between consumption and income are likely to produce spurious and misleading results if the underlying data are non-stationary. As a preliminary exercise, we therefore test for the level of integration of the time series using both the Augmented Dickey-Fuller test and the Phillips-Perron test. For brevity, results are not shown but only summarised. For most countries, we find income and consumption to be integrated of order one, I(1). Only for Greece and for the consumption series in France we do find differing results across tests. The Spanish time series are found to be I(2).

There are several different approaches to the econometric analysis of consumption behaviour.[3] The econometric design in this paper follows the tradition of the so-called habit persistence approach. By its very nature, the relationship between income and consumption is a long-term phenomenon and the dynamic adjustment may take several periods. Thus, a cointegration approach is ideal to analyse private consumption over longer time spans. We specify error-correction models for private consumption of the EMU member states. Results may be interpreted as a stationary long-term relationship only if time series are cointegrated. However, in the context of the EMU, short-term adjustment is also of importance, as different shock-absorption capacities and consumption dynamics could have major cyclical consequences for the EMU. These considerations suggest that an error-correction model is an appropriate specification.

Kremers et al.[4] argue that a two-stage approach based on Engle and Granger[5] is rather restrictive due to a common

3 See J. Wolters: Der Zusammenhang zwischen Konsum und Einkommen: Alternative ökonometrische Ansätze, RWI-Mitteilungen, Vol. 43, 1992, pp. 115-132.
4 See J. Kremers, N. Ericsson, J. Dolado: The Power of Cointegration Tests, in: Oxford Bulletin of Economics and Statistics, Vol. 54, No. 3, 1992, pp. 325-348.
5 R.F. Engle, C.W.J. Granger: Co-integration and error correction: Representation, estimation and testing, in: Econometrica, Vol. 55, 1987, No. 2, pp. 251-276.

factor restriction and favour a one-stage approach. We thus estimate the following error-correction model:

$$\Delta C_t = \gamma_0 + \gamma_1 \Delta C_{t-1} + \gamma_2 \Delta Y_t + \alpha [C_{t-1} - \beta_1 Y_{t-1}] + u_t \qquad (1)$$

The coefficients γ_1 and γ_2 capture the short-term dynamics, and α measures the speed of adjustment to the long-term equilibrium. The parameter β_1 captures the long-run marginal propensity to consume to income as the underlying time series are used in non-logarithmic form. Implicitly, this approach neglects the contemporaneous influence of the change in consumption on the change in GDP, assuming that it is small.[6]

Equation (1) is transformed to

$$\Delta C_t = a_0 + a_1 \Delta C_{t-1} + a_2 \Delta Y_t + a_3 C_{t-1} + a_4 Y_{t-1} + u_t \qquad (2)$$

The coefficient a_3 is the so-called error-correction parameter and reflects the speed of adjustment. The long-term marginal propensity to consume is implicitly defined as:

$$\hat{\beta}_1 = - \frac{\hat{a}_4}{\hat{a}_3} \qquad (3)$$

Following Kremers et al., the existence of a cointegrating vector can be directly assessed from the t-statistic of $\hat{a}_3$. If the underlying level variables are non-stationary, if the residuals of the estimated equation (2) are normally distributed, and if the coefficient is significantly different from zero based on an ordinary t-test, a long-term cointegrating relation is confirmed.

Table 1 summarises the estimation results using Equation (2) for Germany and the euro area (both including and excluding Germany). For the period before the financial crisis (1999-2008), we find a cointegrating vector for all country groups. The residuals are normally distributed, stationary and are not serially correlated, so that we can interpret the coefficients. The estimated coefficient is significantly different from zero, based on the t-statistic. However, the size of the implied long-run marginal propensity to consume differs strongly between Germany and the euro area. In Germany, this propensity to consume is close to zero, which documents the decoupling of output and real private consumption seen in Figure 1. In contrast, the respective parameter in the euro area is much higher (0.416). As a consequence, excluding Germany from the euro area leads to a further increase of the estimated implied long-run marginal propensity to consume to 0.542.[7]

To compare the adjustment dynamics in Germany and the euro area, we first take the estimated error-correction coefficients as a guide. On the one hand, they are quite similar for Germany and the euro area as a whole. However, on the other, the short-run influence of income on private consumption turns out to be much stronger in the euro area than in Germany. This suggests that short-run multiplier effects as a propagation mechanism are stronger in the other euro area member countries than they are in Germany. Exogenous shocks as well as policy impulses then have stronger short-run effects in the other member countries. This contributes to cyclical asymmetries in the euro area.

The longer estimation period 1999-2010, which includes data for the international financial and economic crisis, does not critically change this picture, especially for the euro area. The aggregate consumption function for the euro area shows a statistically reliable relationship with a high explanatory power of income for private consumption. The size of the coefficients is plausible and very close to the coefficients in the shorter period. For the EMU, we find a long-run marginal propensity to consume of 41.9%; the adjustment to the long-term relationship is performed with a coefficient of 0.30 per quarter. We find significant autoregressive short-term dynamics because the change in consumption is negatively affected by the change in consumption in the previous quarter. Again, we find a positive effect of current period income on current consumption. Overall, the coefficient of determination is relatively high (R^2=0.50). Excluding Germany from the euro area aggregate again leads to a higher marginal propensity to consume of 54.2%. However, the error-correction coefficient is no longer significant, so we do not take this estimate as a reliable figure.

6 Our single equation approach assumes income to explain consumption. However, income depends in the short term on consumption, and thus we have an interdependent relationship. Estimation of such a relationship as a reduced form could possibly lead to biased results. An instrumental variable (IV) approach would be preferable which is used for instance in Assenmacher, where gross investment is taken as an instrument. See: W. Assenmacher: Auf dem Weg zum Eurokonsumenten? Die Konsumstruktur im Euro-Währungsraum, in: Essener Unikate, No. 12, 1999, pp. 79-83. In order to test the robustness of our single equation approach, we estimate vector error correction models which do not impose unidirectional causality at the outset. In most estimations, apart from the rather small countries Belgium, Luxembourg and Austria, we still find a cointegrating vector and the long-term relationship significantly enters the equation for consumption but not the equation for income. We thus conclude that the influence of income on consumption dominates the reverse effect and we do not use an IV approach.

7 These long-run marginal propensities to consume are relatively small, which can possibly be explained by the fact that output is a poor proxy for the development of disposable household income.

Table 1
Results for Germany and the Euro Area

Country	constant	ΔC_{t-1}	ΔY_t	C_{t-1}	Y_{t-1}	Implicit c	R^2	DW	ADF	JB
Germany 1999-2008	99.85*** (2.83)	-0.21 (-1.40)	0.10 (1.12)	-0.32** (-2.60)	-0.01 (-0.29)	-0.016	0.35	2.11	0.00	0.45
EMU 1999-2008	81.74** (2.42)	-0.34** (-2.41)	0.42*** (5.40)	-0.29* (-1.86)	0.12* (1.67)	0.416	0.57	1.98	0.00	0.43
EMU without Germany 1999-2008	14.50* (1.82)	-0.15 (-0.90)	0.51*** (6.28)	-0.43** (-2.05)	0.23* (1.96)	0.542	0.62	1.91	0.00	0.52
Germany 1999-2010	96.87*** (3.02)	-0.20 (-1.52)	0.11* (1.74)	-0.32*** (-2.89)	0.00 (0.08)	0.001	0.34	2.05	0.00	0.57
EMU 1999-2010	85.05*** (3.33)	-0.32*** (-2.58)	0.32*** (5.01)	-0.30*** (-2.63)	0.13** (2.32)	0.419	0.50	2.01	0.00	0.31
EMU without Germany 1999-2010	13.58 (1.62)	-0.21 (-1.50)	0.38*** (5.46)	-0.13 (-1.45)	0.07 (1.22)	0.493	0.54	2.11	0.00	0.61

***, **, * significantly different from zero at 1, 5, 10% level respectively; t-statistics in parentheses. Euro area aggregate: euro area 12 countries (excluding Greece and Ireland due to incomplete data).

In sum, we find notable differences in consumption behaviour between Germany and the rest of the EMU. This implies that theoretical investigations of the euro area including the two regions Germany and the rest of EMU cannot assume uniform consumption behaviour.

The inclusion of the period of the financial crisis in 2009/2010 has different implications for the two regions. While the estimated long-term relation for Germany is more or less unaffected by the choice of a different base period and only a short-term influence of income on consumption evolves, the significant and stable long-term relationship for the EMU (excluding Germany) vanishes if the financial crisis is included. However, the results for the euro area in its entirety remain largely unchanged with the exception of the short-term impact of income on consumption. This is plausible as long as consumers regarded the financial crisis as a temporary phenomenon such that they should lower their consumption by less than the fall in output. This is already visible in Figure 1, where consumption in the euro area economies (excluding Germany) falls less than output. A Chow test for a structural break indeed indicates a structural break in the first quarter of 2009 for the euro area both with and without Germany. For Germany, however, we do not find a structural break in this period. For the euro area without Germany, we also find a change in the relationship using the Chow forecast test while the result is ambiguous for the EMU including Germany.

Table 2 shows the results for the individual EMU member countries. We use the same specification for all countries, which appears to be the best specification for the EMU aggregate, in order to ensure comparability between the aggregate and individual country level results.[8] The column "implicit c" again shows the calculated long-term marginal propensity to consume. We cannot confirm the existence of a stationary long-term relationship between income and consumption for Finland, Ireland, Italy and Portugal. For all other countries we find a cointegrating vector. The estimated coefficients are well in line with our expectations and with the average consumption shares shown in Figure 3. An above average consumption share is again found for the southern European countries including France, while the Benelux countries and Austria show a lower propensity to consume. Germany is the only exception with a complete decoupling of consumption and income. Table 2 also shows that in countries such as Finland, Italy, Portugal and Spain, consumption seems to be primarily a short-term phenomenon. For these countries, the change in consumption is mainly influenced by the autoregressive term and the change in current output. Overall, the statistical reliability of the results is satisfactory with the exception of Greece. Serial correlation and the existence of unit roots in the residuals can be rejected; we confirm the normal distribution of residuals. The estimation for Greece has much less explanatory power and the residuals are not normally distributed. We attribute this result partly to the shorter time series for Greece.

In conclusion, we cannot simply transfer a uniform euro-consumption function into the single countries. The estimated marginal propensities to consume lie between 0.00 and 0.67 (excluding Portugal, which is to be understood

8 The same approach is used by Clausen in order to identify asymmetries in national money demand functions. See: V. Clausen: Money Demand and Monetary Policy in Europe, in: Weltwirtschaftliches Archiv, Vol. 134, No. 4, 1999, pp. 712-740.

Table 2
Results for the Euro Area Countries (1999-2008)

Country	constant	ΔC_{t-1}	ΔY_t	C_{t-1}	Y_{t-1}	Implicit c	R^2	DW	ADF	JB
Belgium	3.93*** (2.79)	-0.21 (-1.38)	0.24*** (3.43)	-0.38*** (-2.67)	0.14 (2.53)	0.371	0.39	1.80	0.02	0.75
Germany	99.85*** (2.83)	-0.21 (-1.40)	0.10 (1.12)	-0.32** (-2.60)	-0.01 (-0.29)	-0.016	0.35	2.11	0.00	0.45
Finland	-0.19 (-0.46)	-0.26* (-1.73)	0.31*** (4.15)	-0.22 (-1.50)	0.12 (1.49)	0.532	0.42	2.25	0.00	0.70
France	-18.20** (-2.36)	-0.02 (-0.12)	0.32*** (3.92)	-0.57*** (-3.03)	0.37** (2.97)	0.652	0.46	1.84	0.00	0.96
Greece	0.45 (1.10)	0.02 (0.09)	0.06 (0.63)	-0.18* (-1.77)	0.12* (1.73)	0.676	0.12	1.91	0.00	0.01
Ireland	1.16* (1.80)	-0.37* (-1.83)	0.14* (1.76)	-0.36 (-1.37)	0.11 (1.30)	0.329	0.34	1.53	0.01	0.34
Italy	2.80 (0.92)	-0.18 (-1.19)	0.43*** (6.08)	-0.19 (-1.40)	0.10 (1.25)	0.539	0.61	2.16	0.00	0.80
Luxembourg	0.83*** (3.74)	-0.17 (-1.17)	0.00 (-0.06)	-0.49*** (-3.72)	0.06*** (2.97)	0.112	0.36	1.82	0.00	0.46
Netherlands	17.22*** (4.66)	-0.19 (-1.51)	0.21** (2.21)	-0.49*** (-4.26)	0.09*** (3.19)	0.172	0.52	2.20	0.00	0.58
Austria	7.36*** (2.86)	-0.02 (-0.13)	0.06 (0.66)	-0.39*** (-2.71)	0.08** (2.25)	0.193	0.21	1.99	0.00	0.60
Portugal	-1.18 (-1.11)	0.26* (1.70)	0.51*** (5.35)	-0.12 (-1.39)	0.11 (1.39)	0.949	0.50	2.14	0.00	0.52
Spain	-5.09 (-1.53)	-0.60*** (-3.09)	1.72*** (7.15)	-0.52* (-1.97)	0.35* (1.93)	0.668	0.67	1.98	0.00	0.81

***, **, * significantly different from zero at 1, 5, 10% level respectively; t-statistics in parentheses. Greece only 2001-2008 and Ireland only 1999 -2007 due to incomplete data.

as an outlier). We also do not find a uniform speed of adjustment to the long-term consumption path. For the significant results this parameter lies between 0.18 and 0.57. In addition, some of the countries, especially Spain, display rather short-term oriented consumption behaviour.

Conclusions and Outlook

The experience after the establishment of EMU shows that the behaviour of private consumption differs considerably among member countries. The average and marginal propensities to consume are fairly heterogeneous. Behaviour differs with respect to the long-term impact of income on private consumption as well as with respect to the dynamic adjustment processes toward the long-run equilibria. Furthermore, taking the standard deviations and the range of propensities to consume within the euro area, it appears that differences have increased rather than decreased.

In particular, our analysis reveals differences between Germany and the rest of the euro area. This causes adjustment problems within the monetary union. In the short run, common exogenous shocks or policy impulses trigger asymmetric cyclical developments within the monetary union. In the medium to long term, countries with above-average savings tend to accumulate wealth and net foreign asset positions. These international capital flows finance current account deficits in the recipient countries and cause adjustment problems for recipient countries as long as the inflows are used for financing higher private and public consumption instead of investment. This transfer of savings from Germany to the countries running deficits was greatly facilitated by the introduction of the common currency. From the perspective of German savers, it removed two kinds of risks. The exchange rate or realignment risk, as it is commonly expected that all countries, once in the monetary union, will continue to remain members. Furthermore, despite the presence of a no-bailout clause in the Treaty of Maastricht, there was a widely held perception in financial markets that in the case of financial difficulties, other member countries would step in for financial support. The removal of these two risks in conjunction with the generally lower transaction costs of cross-border payments within the euro area facilitated the channelling of German savings into the deficit countries. The longer term adjustment problems are now becoming visible, in Greece in particular.

Expanding the data set to include the data for the period of the international financial and economic crisis leads to structural changes in the estimated coefficients of the consumption functions. Using Chow tests for structural change, we find that the structural changes mostly concern the euro area countries other than Germany. The test results for the aggregate consumption function are somewhat ambiguous. Including further data from upcoming periods will hopefully provide more clear-cut evidence on whether there is a structural change in the aggregate consumption function in the euro area. Our analysis generally raises the question of the underlying reasons for the fairly weak private consumption in Germany. The corresponding analysis would require a more detailed perspective on the development and the components of disposable private income.

The asymmetric consumption functions contributed to cyclical asymmetries in the euro area. The relatively poor growth performance of Germany in the first decade of the monetary union stems in part from weak private consumption. However, the sources of growth differentials within the euro area are complex and stem from different factors on both the demand and the supply side.[9] For this reason it is, at this stage, impossible to assess the specific quantitative contribution of asymmetries in consumption to growth differentials in the euro area. This requires further analyses which go beyond the scope of the present paper. However, given the heterogeneity in consumer behaviour and the signs of continued dispersion, it is clearly necessary to monitor private consumption behaviour within the euro area to a greater extent than previously. This refers to the fundamental determinants of private consumption, the sources of cross-country differences and, finally, a quantitative assessment of how far these differences translate into cyclical asymmetries within the euro area. For example, public policy in Germany should not additionally subsidise private savings such as in the form of Riester schemes. These tax incentives for further private savings in Germany are likely to aggravate the differences in national savings and contribute to intra-European imbalances in the balance of payments.

9 For more details see European Central Bank (ECB): Output growth differentials in the euro area: sources and implications, in: Monthly Bulletin, April 2007, pp. 73-86.

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