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**EXPLAINING GROWTH DIVERGENCES IN
THE EURO AREA: THE ROLE OF
RESIDENTIAL INVESTMENT**

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Explaining Growth Divergences in the Euro Area: The Role of National Differences in Residential Investment

Over past years, there have been significant differences in cyclical developments in the euro area. The paper addresses the question to what extent these differences can be explained by the pronounced differences in residential construction activity. In our econometric analysis of housing investment in the euro area we, as a first step, distinguish between Germany and the rest of the euro area. This distinction is motivated by the fact that German developments have been special in several respects over the past 20 years and, given the large size of the Germany as a proportion of the euro area economy, influence the developments on an aggregate euro area level significantly (as opposed to, e.g., Austria where housing investment—and population growth—was rather similar to German patterns). Since swings in housing investment in Germany over the recent two decades have been associated with pronounced changes in population growth, special emphasis is given to the importance of demographic developments in explaining diverging trends in housing investment. Population growth and demographic developments that affect the number of households, such as shifts in the share of population in household formation age and falls in the average size of households, all have potentially important implications for housing demand. We estimate functions for Germany and the rest of the euro area where residential investment depends on the existing level of housing stock, real income, the user cost of capital (proxied by the real interest rate) and population growth. In order to quantify the importance that demographic developments through the channel of residential investment have as an explanation of the growth differential between Germany and the rest of the euro area, we simulate how economic activity in the two regions had evolved under the assumption of identical demographic trends using these equations and a macroeconometric model for Germany and the rest of the euro area.

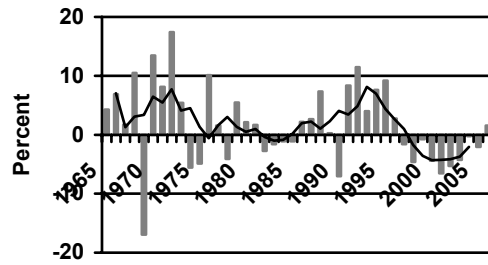
In the literature, the impact of demographic developments on the housing market is usually discussed in the context of house prices.¹ Several studies include demographic variables in their estimated house price equations (e.g. Meen 2002, Ahearne et al. 2005), but they are omitted in recent VAR-studies (Sutton 2002, Tsatsaronis and Zhu 2004). Girouard and Blöndal (2001) discuss the influence of house prices on residential investment through the price-cost ratio, but do not discuss other determinants of residential investment.

¹ For a discussion of recent house price developments in industrial countries and a survey of recent literature see OECD (2006).

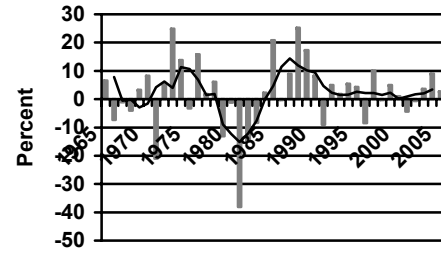
Figure 1: Housing Investment Cycles in Euro Area Countries
– Changes in Gross Fix Capital Formation in Housing Over Previous Year –

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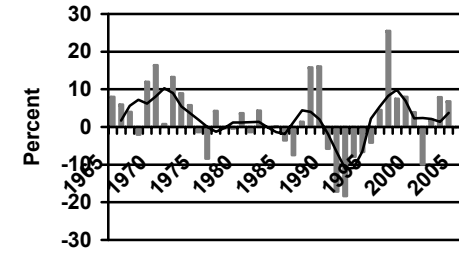
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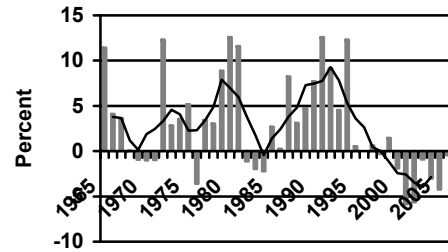
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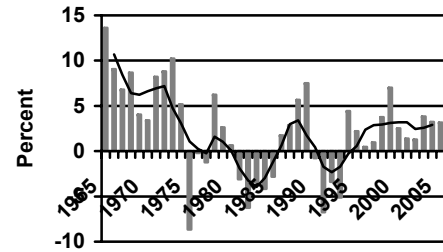
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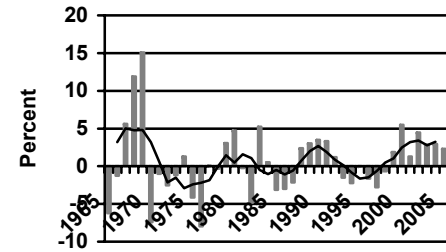
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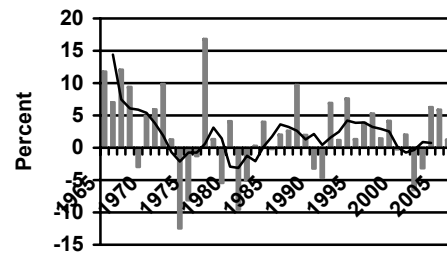
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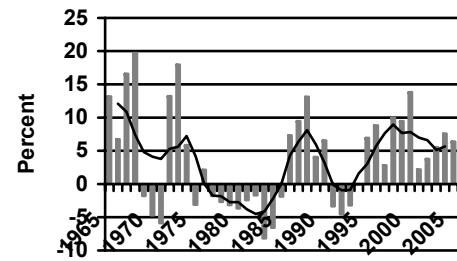
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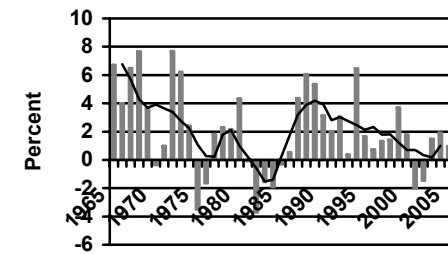
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Spain



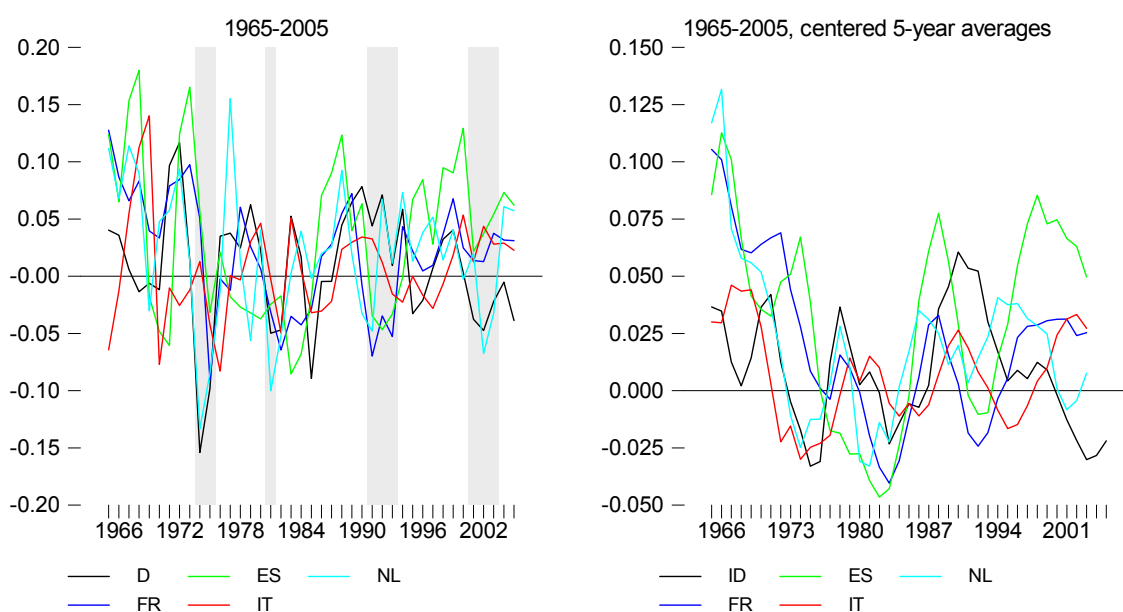
Euro Area



Developments in Residential Investment in the Euro Area

Residential investment is typically a relatively volatile demand component, characterized by pronounced swings in growth rates from year to year and subject to strong cyclical fluctuations. Figure 1 shows the growth rates of residential investment over the past 40 years for the eight largest euro area countries and for the euro area as a whole.² Medium-term fluctuations are given by centered 5-year averages of annual growth rates. Plotting annual growth rates and 5-year averages, respectively, together for the five largest euro area economies (Figure 2) shows that, while annual growth rates have clearly been quite different across countries, there is nonetheless substantial co-movement, both in the short-run and over the medium term.

Figure 2:
Residential Investment Growth in Large Euro Area Countries



Remark: Euro area recession phases are shaded in grey.

Source: OECD Economic Outlook Database; German Federal Statistical Office; own calculations.

It is evident that, notwithstanding a large amount of heterogeneity, national series tended to move in similar directions. This is especially true for

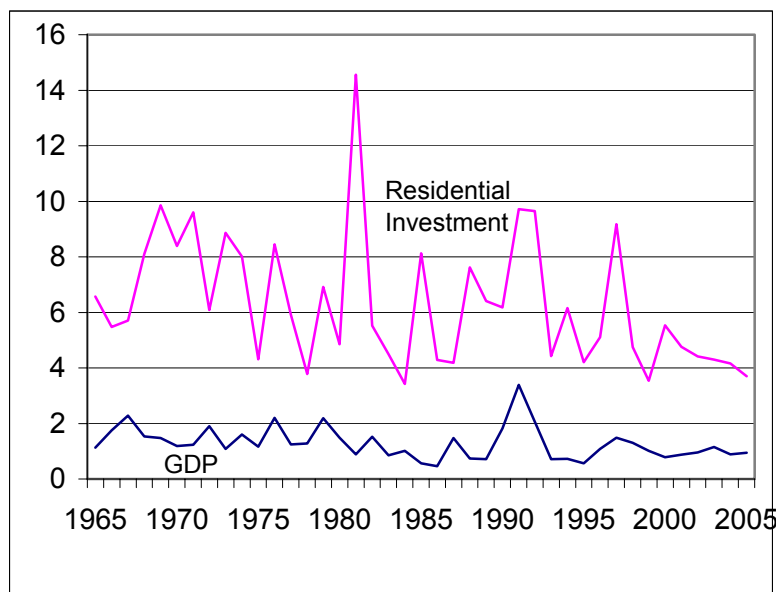
² The euro area data used in this analysis have been constructed from national data that due to data limitations are confined to the 8 largest euro area economies Germany, France, Italy, Spain, the Netherlands, Belgium, Austria and Finland. These countries constitute around 95 percent of the euro area.

recessionary phases (in terms of aggregate output), such as the mid 1970s, the early 1980s and early 1990s, although the timing of the peaks and bottoms varies slightly from one country to another. In the most recent phase of weak production growth between 2001 and 2004, there is also some similarity in that most national series show at least some deceleration of growth. However, the strong deceleration of residential investment growth registered for the euro area as a whole is to a large extent due to a prolonged and pronounced decline in residential investment in Germany; housing investment in other large euro area economies such as France, Italy and Spain by contrast remained relatively strong. There are also similarities observable in medium-term developments as exemplified by the 5-year average growth rates of residential investment depicted in the right panel of Figure 2. Countries typically showed high average growth in the 1960s and early 1970s before growth moderated substantially for about one and a half decade. Growth picked up again in all large countries towards the end of the 1980s, this acceleration phase lasted until the recession of 1991–93, in Germany and in the Netherlands longer. Since then, growth patterns have become somewhat more heterogeneous. While in Germany investment stagnated in the second half of the 1990 and has been falling since 2000, Spain, the Netherlands and France saw a rapid expansion of investment; in Italy investment declined in the second half of the 1990s but picked up after the start of EMU.

The standard deviation of growth rates of residential investment in the euro area is much larger than the standard deviation of aggregate output growth, reflecting the relatively pronounced volatility of this demand component (Figure 3). Although there is no clear trend discernible in the standard deviation over the past 40 years, it is interesting to note that differences in growth rates have been relatively small in the most recent years, while the divergence of economic growth in general and residential construction activity in particular in the years following the German unification is clearly visible.

Figure 3:

Standard Deviation of Growth Rates in Real GDP and Residential Investment in the Euro Area



Source: OECD Economic Outlook Database, own calculations.

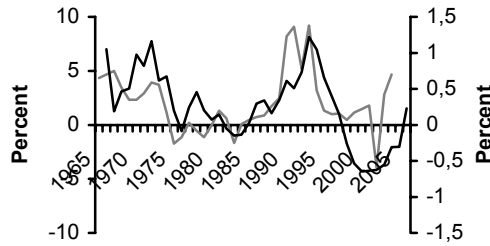
Residential Investment and Population Growth

The post-unification boom in residential investment in Germany has been associated with a sharp acceleration of population growth stemming mainly from immigration from Central and Eastern Europe and refugees from the Balkans.³ Conversely, when residential investment decelerated in the mid-nineties and started to decline towards the end of the century, population growth slowed to a crawl. Inspection of the relationship between population growth and residential investment growth (smoothed using centered 5-year-averages) over a longer period of time and across other euro area countries shows, however, that such a close co-movement of these variables is not the rule. Notwithstanding, a relatively close correlation between population growth and smoothed residential investment growth can also be found in some other euro area countries and in the euro area as a whole (Figure 4). According to the correlation coefficient, co-movements have been most pronounced in France, Austria and the Netherlands. On the other hand, there is relatively little positive correlation between population growth and housing investment growth over the past 40 years in Spain and almost no correlation in Italy; in Finland the data suggest even negative correlation.

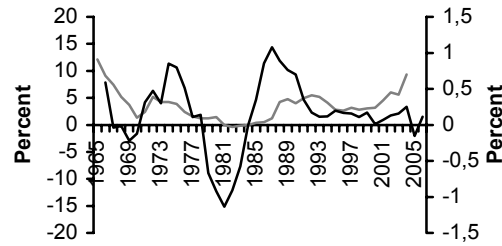
³ There has also been substantial migration within Germany from the “new” Eastern Länder to the “old” Western Länder. This migration does not show up in the population growth for Germany as a whole, but has tightened the housing market in West Germany substantially. Residential investment in East Germany, at the same time, was strongly pushed by tax incentives (see Sander 2000 for a discussion of policies towards the housing market in East Germany after the unification).

Figure 4: Housing Investment and Population Cycles in Euro Area Countries
 – Changes in Population Over Previous Year and 5-Year-Moving-Average of Changes in Gross Fix Capital Formation in Housing –

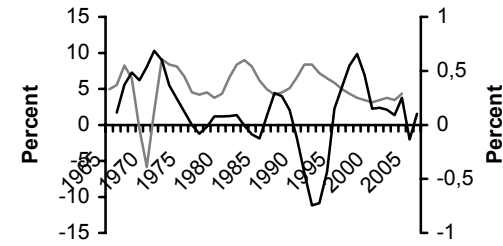
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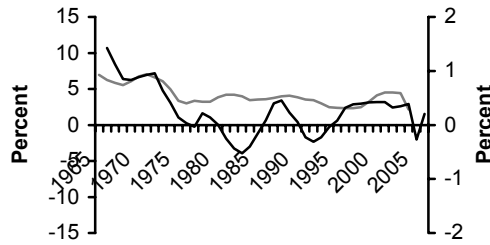
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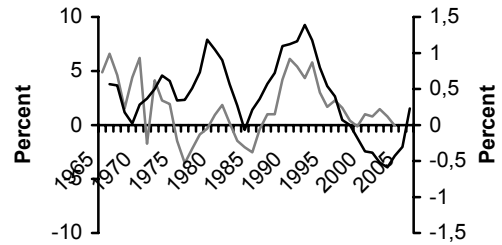
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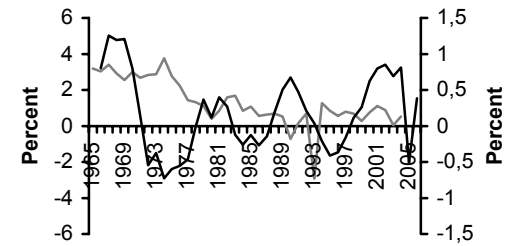
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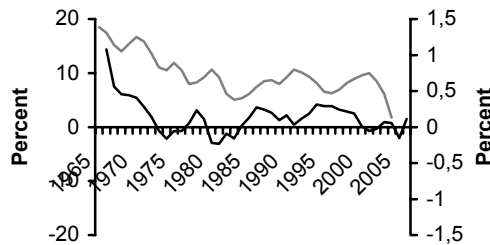
Germany



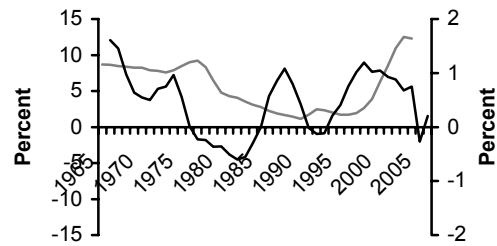
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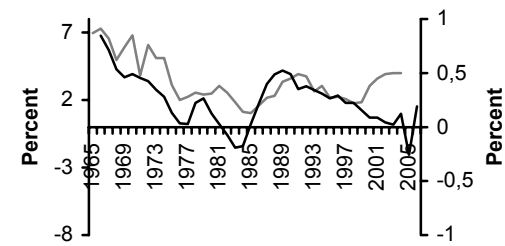
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Spain



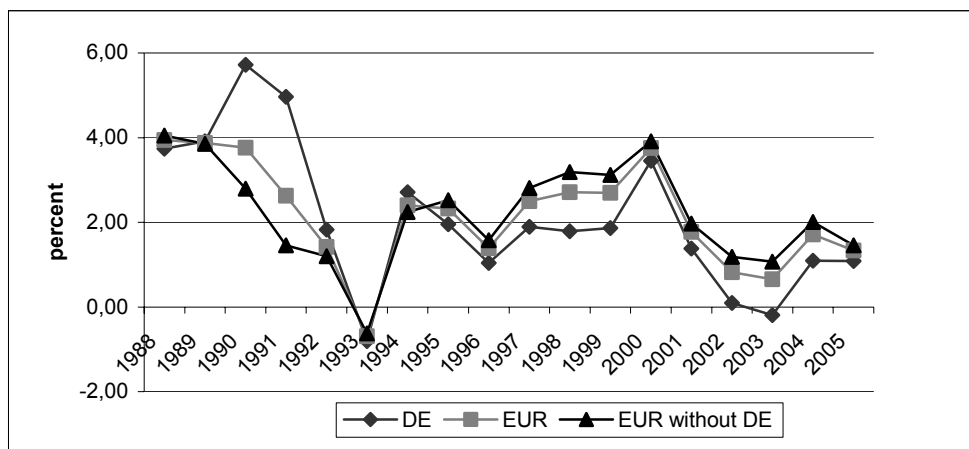
Euro Area



The Role of Residential Investment in Explaining the Growth Differential Between Germany and the Rest of the Euro Area

A markedly different pattern of growth could be observed in Germany compared with the rest of the euro area since the end of the 1980s (Figure 5).

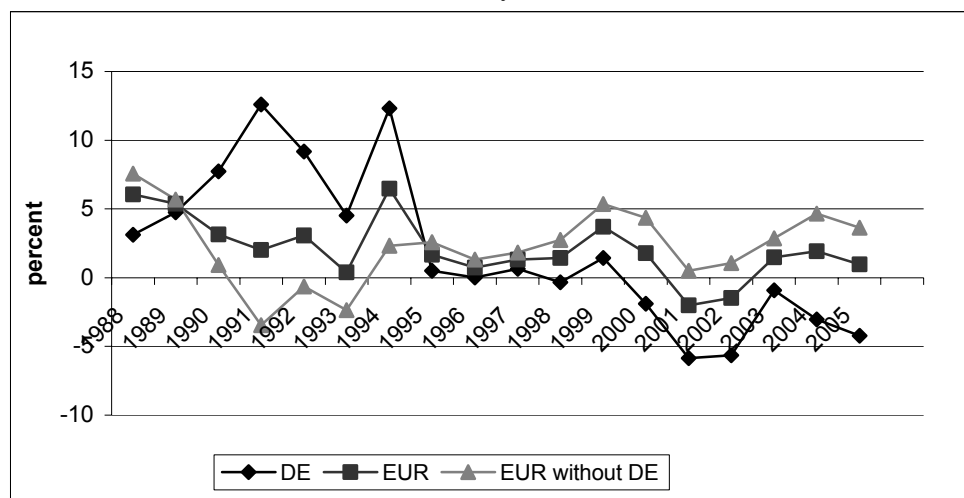
Figure 5:
Real GDP Growth in Germany, the Euro Area and the Euro Area-ex Germany



Source: OECD Economic Outlook Database; own calculations.

In 1990-91, German unification led to a de-synchronization of cyclical developments, triggering a boom in Germany when most other industrial countries experienced deceleration of growth or even recession. Although some of the demand generated in Germany spilled over into neighbor countries, economic growth in the rest of (what is today) the euro area slowed down when German growth accelerated. Following a brief period of almost synchronized growth in 1993 (recession) and 1994 (recovery), from the mid-1990s onwards the German economy consistently grew less rapidly than the rest of the euro area.

Figure 6:
Residential Investment Growth in Germany, the Euro Area and the Euro Area-ex Germany

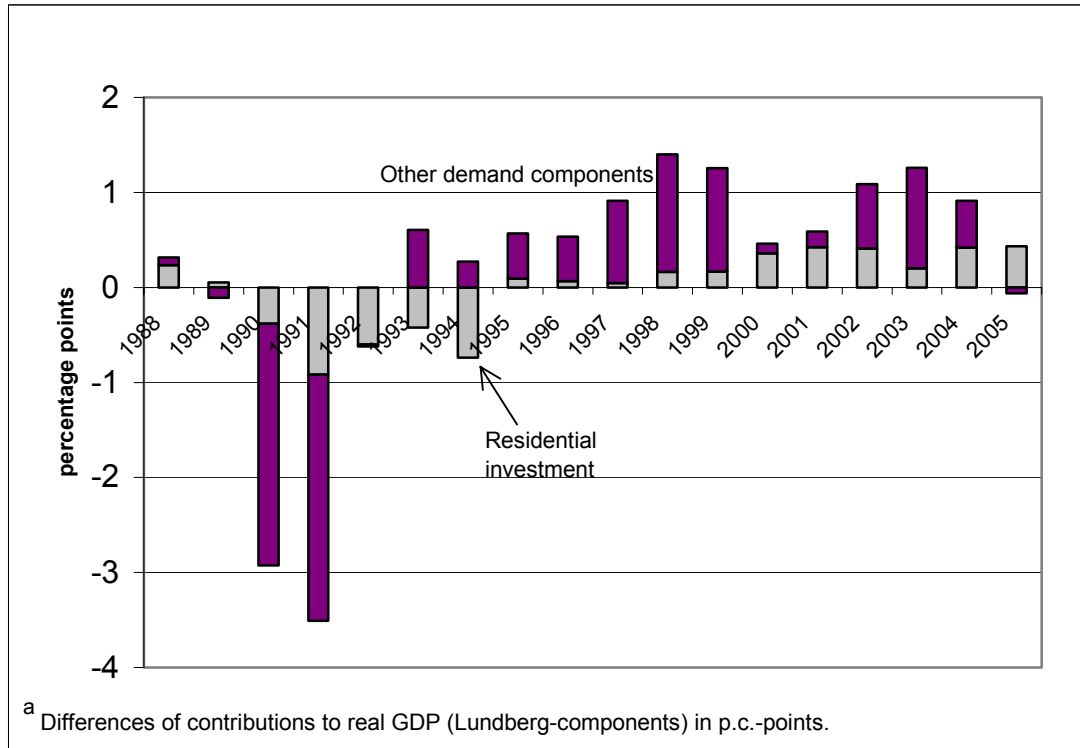


Source: OECD Economic Outlook Database; own calculations.

With respect to residential investment, differences in performance between Germany on the one hand and the rest of the euro area on the other hand are even more pronounced. In the first half of the 90s housing investment grew strongly in Germany triggered by rising population in the West and tax incentives for reconstruction of the housing stock in the East which was in extremely bad shape after more than 40 years of communist rule. At the same time, residential investment in the rest of the euro area declined (Figure 6). Here residential activity recovered towards the end of the century and remained on an upward trend after a period of sluggishness in 2001-2. Meanwhile, investment in housing in Germany fell first into stagnation and then into a prolonged recession. Figure 7 shows the contribution of differences in residential investment growth between the euro area excluding Germany and Germany to differences in real GDP growth, i.e. the differences in the so-called Lundberg component of residential investment, together with the contribution of differences in the aggregate of all other demand components for each year since 1988. It is clear that divergent trends in housing investment play an important role in explaining the overall relative growth performance of the two economic areas, especially in the years 1990–94, when the German rate of growth in residential investment was way above its growth rate in the rest of the euro area, and in the most recent years from 2000–05, when the activity in residential construction was much weaker in Germany than in the euro area. In some years, virtually the complete GDP growth differential can be explained by differences in residential investment growth.

Figure 7:

Contribution of Residential Investment and Other Demand Components to the Growth Differential in Real GDP between Euro Area-ex Germany and Germany



Source: OECD Economic Outlook Database; own calculations.

Explaining Residential Investment

The Model

Residential investment is the result of an interaction of three markets, the market for flats to rent, the (stock of) housing market and the residential construction market. In fact, in the long run, any separation of these three markets is artificial as the housing stock can be expanded or reduced in an arbitrary way by means of residential investment (or disinvestments). It is only in the short run, that the markets are separated due to the fact that residential investment takes time.

As regards modelling the demand side of the housing market,⁴ we assume that the desired stock of housing in the economy, h^* , depends negatively on the real user costs of housing u and positively on permanent income \bar{y} and demo-

⁴ See Peek and Wilcox (2006) and McCarthy and Peach (2002) for similar models.

graphic variables such as the share of the population in house buying age (*demo*):⁵

$$(1) \quad h^d = h^d(\bar{y}, u, demo)$$

With respect to the supply of housing, we simply assume that it depends on the real price of houses p^h

$$(2) \quad h^s = h^s(p^h)$$

In the long run equilibrium, demand will equal supply and the equilibrium housing stock is

$$(3) \quad h^* = h^s = h^d$$

In the short run, however, the actual housing stock may deviate from its equilibrium level due to the fact that residential investment (I) takes time. Speeding up the investment process would be costly, or is even impossible in the short term given existing regulations and land-use restrictions.⁶ As a result, there is an optimal rate of changing the housing stock given by the relation

$$(4) \quad (I/H)_t = \alpha(h_{t-1} - h^*)$$

with α measuring the speed of adjustment towards the equilibrium housing stock. Substituting (1)–(3) into (4) we get an equation for residential investment that could in principle be estimated

$$(5) \quad (I/H)_t = \alpha(h_{t-1} - \beta_1 \bar{y}_{t-1} + \beta_2 u_{t-1} - \beta_3 demo_{t-1}) .$$

To make equation (5) operational, we approximate permanent income \bar{y} by current income y . In addition, we use the real rate of interest R , measured by the short-run nominal interest rate minus the inflation rate, to approximate the user costs of housing and the growth rate of the population *pop* as a demographic variable. Moreover, we allow for more general dynamics by adding additional lags of all variables in first differences, denoted as Δ , giving

⁵ If not stated otherwise, lower case letters refer to the logarithm of a variable.

⁶ The regulatory environment has been found to be important in explaining the slow response of housing supply with respect to house prices that is found in some European countries and the variation of the supply elasticities across euro area countries (European Commission 2006).

$$(5) \quad (I/H)_t = \alpha(h_{t-1} - \beta_1 y_{t-1} + \beta_2 R_{t-1} + \beta_3 \Delta pop_{t-i}) + \sum_{i=1}^p \delta_{1i} \Delta(I/H)_{t-i} + \sum_{i=0}^p \delta_{2i} \Delta y_{t-i} + \sum_{i=1}^p \delta_{3i} \Delta R_{t-i} + \sum_{i=1}^p \delta_{4i} \Delta \Delta pop_{t-i}$$

where now $\Delta \Delta pop$ is the change of the population growth rate.

Data

We estimate equation (5) for Germany and for the rest of the euro area. We use annual data that reach back into the 1960s. This permits us to consider the effects of population growth which is a low frequency variable. Our data for Germany comes from the federal statistical office. We merge German data from 1990 backwards with West-German data by using the West-German growth rates for 1991 to avoid a break in the series due to unification.

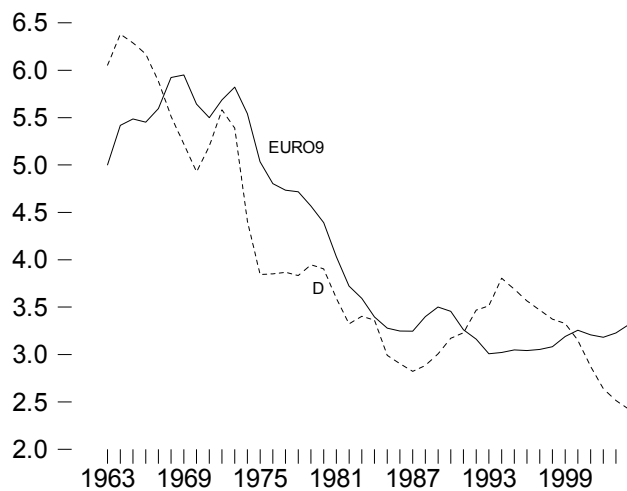
Data for the rest of the euro area is basically constructed from the OECD Economic Outlook database by aggregating individual country data for gross fixed capital formation in housing, real GDP, interest rates and inflation. Due to data limitations the “rest of the euro area” is confined to France, Italy, Spain, the Netherlands, Belgium, Austria and Finland (EURO-7).⁷ Since data on the housing stock is not available from this database, we construct a housing stock variable by applying the perpetual inventory method to the sum of residential investment across the EURO-9 countries for each year and assuming a rate of depreciation of 1% per year. To obtain a starting value for the stock of housing, we assume that residential investment in 1963 was 5% of the housing stock; this figure is somewhat higher than the relation between new and existing flats in the countries at that time but below the respective figure for Germany, which is 6%. Figure 3 shows residential investment in relation to the housing stock, that is (I/H) , for Germany and for the rest of the euro area over the period of 1965 to 2005. Clearly, there is a similar long-run pattern in the two time series (Figure 8).

As regards the determinants of residential investment apart from income, Figure 9 summarizes the developments of real interest rates and population growth rates since the 1960s. Real interest rates were low both in Germany and in the rest of the euro area in the 1960s, fell in the 1970s and increased to relatively high levels in the 1980s and early 1990s. Since then, they have been falling again across the board, although the fall has been much more pronounced in the rest of the euro area than in Germany. Population growth was high in the 1960s across the two regions and declined later, with the slowdown having been more pronounced in Germany than in the rest of the

⁷ These countries represent more than 90 percent of the euro area excluding Germany.

euro area. In the early 1990s (West-) Germany temporarily experienced a substantial acceleration of population growth as a result of unification and the influx of immigrants from Eastern Europe which was not observed in the rest of the euro area.⁸ Since the mid 1990s, the picture reversed: population growth in Germany has been close to stagnation while population growth in the rest of the euro area has been accelerating.

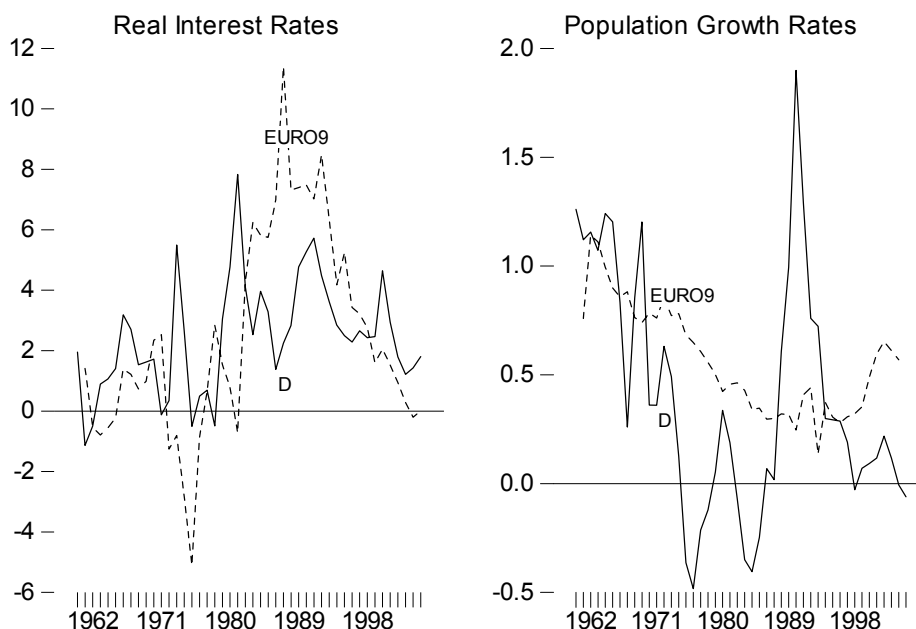
Figure 8:
Residential Investment in Relation to the Housing Stock in Germany and in the Euro Area—ex Germany (percent)



Source: OECD Economic Outlook Database, German Federal Statistical Office; own calculations.

⁸ The exception is Austria which experienced a similar population dynamics as Germany.

Figure 9:
Real Interest Rates and Population Growth Rates in Germany and in the Euro Area–ex Germany
(percent)



Source: OECD Economic Outlook Database, German Federal Statistical Office; own calculations.

Estimation Results

We estimate equation (5) for Germany and for the rest of the euro area over the period of 1965 to 2005 as a system of seemingly unrelated regressions (SUR). Unfortunately, when specifying the dynamics of the equation using single-equation OLS, various tests indicate instabilities in the equation for the rest of the euro area in the early 1970s. We therefore restrict the sample to the period of 1973 to 2005.

Imposing the restriction that the housing stock will in the long run grow in line with real GDP (real disposable income in the case of Germany) we find for Germany (absolute t -statistics in parenthesis):

$$\begin{aligned} (I/H)_t = & -0.013 \left(h_{t-1} - y_{t-1} - 1.57 R_{t-1} + 5.43 \Delta pop_{t-1} \right) + \\ & \quad (5.62) \quad (4.16) \quad (4.33) \\ & + 1.07 \Delta(I/H)_{t-1} - 0.34 \Delta(I/H)_{t-2} + 0.03 \Delta R_t \\ & \quad (11.11) \quad (3.45) \quad (2.70) \end{aligned}$$

T : 1973-2005, R^2 : 0.97, DW : 2.4

For the rest of the euro area we get the result

$$\begin{aligned}
 (I/H)_t = & -0.052 \left(h_{t-1} - y_{t-1} + 5.57 \Delta pop_{t-1} \right) + \\
 & + 0.50 \Delta(I/H)_{t-1} - 0.12 \Delta(I/H)_{t-2} + 0.09 \Delta y_t + 0.02 \Delta y_{t-3} \\
 & - 0.27 \Delta \Delta pop_t - 0.52 \Delta \Delta pop_{t-1} - 0.32 \Delta \Delta pop_{t-2} \\
 & \quad \quad \quad (7.17) \quad \quad \quad (3.36) \quad \quad \quad (11.11) \quad \quad \quad (3.45) \quad \quad \quad (2.70) \quad \quad \quad (9.62) \\
 & \quad \quad \quad (4.77) \quad \quad \quad (5.71) \quad \quad \quad (3.86)
 \end{aligned}$$

T: 1973-2005, R² : 0.99, DW: 2.3

Both equations fit the data quite well. They are free of autocorrelated residuals and tests for structural change do not indicate any instabilities. Note that there is no real interest rate in the equation for the rest of the euro area as the estimates turned out to be insignificant. The insignificance of the real interest rate in this equation is somewhat irritating and will be subject to further investigation in future research. One possible explanation may be that there are problems with the aggregation of individual countries' real interest rates to a single variable or that the real interest rate variable chosen does not properly reflect the user cost of capital.

The long-run influence of population growth is quite similar across the two regions. In fact, the restriction that the two long-run coefficients are equal cannot be rejected statistically. Imposing this restriction gives a long-run coefficient for population growth of 5.48. That is, an increase in population growth by 1 percentage point in the long-run leads to an increase in the housing stock by almost 5.5 percent in both regions.

The dynamics are quite different across the two regions, however. Overall, converge to the equilibrium housing stock seems to be faster in the rest of the euro area than in Germany. Moreover, residential investment in the rest of the euro area seems to react immediately to a change in population growth while in Germany it takes 3 years before there is any effects. Also, the dynamic effects in the rest of the euro area are more complicated.

A Tentative Simulation

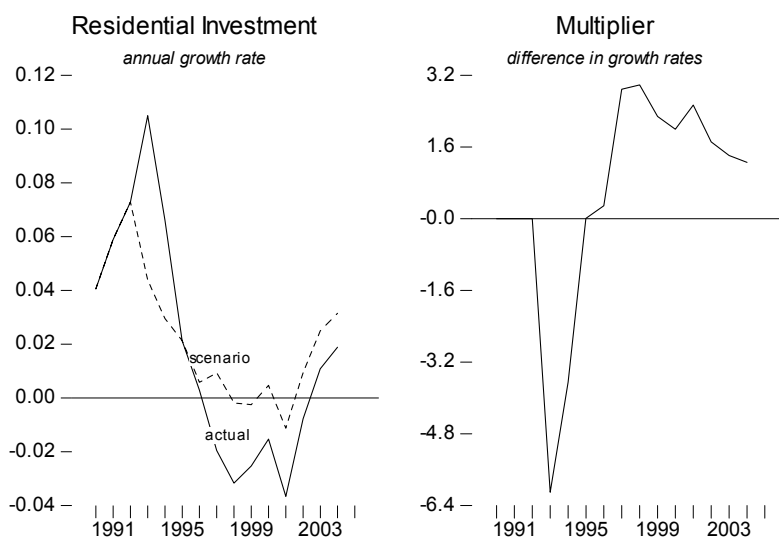
To demonstrate some implications of the estimated equations, we use them to analyse the following question: Given the quite different population growth rates in Germany and in the rest of the euro area, how would residential investment in Germany have developed had the German population growth rate been the same as in the rest of the euro area. To keep the simulation as simple as possible we abstract from feedback effects with the rest of the economy. Also,

we do not consider the possibility that real income growth may have developed differently with different population growth.

We simulate the model dynamically, starting in 1990. As we are ultimately interested in the effects of different population growth on GDP growth (via residential investment), we focus on the annual growth rate of gross fixed investment in housing instead of the growth in the housing stock. We find that a different pattern of population growth in Germany would have had substantial effects on the growth rate of residential investment. While residential investment in Germany had been lower in the early 1990s, it would have been between 1.5-3 percentage points higher in the late 1990s and the early 2000s (Figure 10).

The impact on GDP growth would, however, have been only moderate. With a share of residential investment in GDP of about 6 percent, differences in population growth can only explain 0.1–0.2 percentage points of the 1 percentage point difference in GDP growth rates between the rest of the euro area in Germany that was observed over recent years.

Figure 10:
Simulated Residential Investment Growth in Germany



Note: Solid line in the graph on the left hand side shows simulated residential investment growth given the actual data for population growth in Germany, broken line shows simulated growth assuming a population growth rate for Germany as in the rest of the euro area.

Source: OECD Economic Outlook Database, German Federal Statistical Office; own calculations.

Summary and Conclusions

Differences in growth dynamics within the euro area have been pronounced in recent years with German growth especially sluggish relative to the rest of the euro area. A substantial part of the growth differential between Germany and the rest of the euro area is due to the strong differences in residential investment growth which has been declining in Germany since the end of the 90s while expanding swiftly in the rest of the euro area. In Germany, changes in population growth have been pronounced in the past two decades and demographic developments have differed markedly from those in the rest of the euro area. Estimation of functions explaining housing investment for Germany and the euro area confirm a significant impact of population growth on residential construction in both cases. A simulation exercise based on these equations finds that if population growth in Germany had been the same as in the rest of the euro area the profile of housing investment in Germany would have been significantly altered and much less different from that in the rest of the euro area. However, while the effect of differences in population growth are not negligible, differences in demographic developments are found to account for only 10–20 percent of the growth differential between Germany and the rest of the euro area that has been observed in recent years. Therefore, in order to explain differences in intra-euro area growth dynamics other factors than demographics have to be taken into account.

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