

**The implications of demographic change for the
regional retail trade relevant purchasing power in North
Rhine-Westphalia**

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ABSTRACT

The choice of location for a retail shop is a complex process that determines the economic success of the store. The right choice depends on accessibility, purchasing power, demand structure and the competitive situation. The latter factors have considerable impact in the long run when consumption patterns and disposable income differ due to demographic changes.

There already exist several kinds of retail trade relevant purchasing power indicators on regional level. The shortfall of these indicators is however that they focus only on one point in time, i.e. that they are static and thus fail to show the prospective positive or negative factors for the locational choice due to changes in income or population. Furthermore they merely indicate the purchasing power of an average representative consumer in the relevant region though it shows in the data (Household budget survey) that the expenses and consumption structure differ considerably between different socioeconomic groups.

Integrating the consumption behaviour of different age groups relating to retail trade in the multidimensional, macroeconomic model PANTA RHEI REGIO II, a dynamic retail trade relevant purchasing power indicator results that takes the different demographic changes into account. The indicator will be modelled using the German Federal State North Rhine-Westphalia as an example.

1 INTRODUCTION

The choice of location for a retail shop is a complex process that determines the economic success of the store. The right choice depends on accessibility, purchasing power, demand structure and the competitive situation. The latter factors have considerable impact in the long run when consumption patterns and disposable income differ due to demographic changes.

There already exist several kinds of retail trade relevant purchasing power indicators on regional level. The shortfall of these indicators is however that they focus only on one point in time, i.e. that they are static and thus fail to show the prospective positive or negative factors for the locational choice due to changes in income or population. Furthermore they merely indicate the purchasing power of an average representative consumer in the relevant region though it shows in the data (Household budget survey) that the expenses and consumption structure differ considerably between different socioeconomic groups.

Integrating the consumption behaviour of different age groups relating to retail trade in the multidimensional, macroeconomic model PANTA RHEI REGIO II, a dynamic retail trade relevant purchasing power indicator results that takes the different demographic changes into account. The indicator will be modelled using the German federal state North Rhine-Westphalia as an example. This federal state has been chosen because on the one hand it is one of the most important ones within Germany and on the other hand represents well the overall structure in Germany. In its regions on NUTS 3 level it combines dense as well as rural areas, shows very high and very low income levels, is confronted with different age composition and demographic prospects and its production focus on different sectors (industries, services, tourism, trade etc.) depending on the region.

It shows that the highest retail trade relevant consumption level can be found in big cities and prosperous regions where private households have more than the average net income at their disposal. The same is true for the opposite case: low net income and high unemployment imply less retail trade relevant purchases. This situation will basically not change in future. With regard to growth rates between 2008 and 2020 regions starting with a comparatively young population perform best. They can be mainly found in rural areas at the border of North-Rhine Westphalia.

The paper is organised as follows. In the next section consumption patterns of private households depending on age will be analysed stating the importance to implement demographic components in purchasing power indicators. In section 3 the data and model used to calculate the retail trade relevant purchasing power is introduced. Furthermore, a detailed description of the structure and calculation procedure is given. Thereafter, the results on NUTS 2 as well as NUTS 3 level are presented. Section 5 concludes the study.

2 THE RELEVANCE OF AGE FOR CONSUMER BEHAVIOUR IN NRW

Retail trade in North-Rhine Westphalia (NRW) is faced with consumption behaviour depending on income levels, and habits. Age, household size, profession and family composition influence both factors. The first component, the age of the consumer, gives already valuable information about the goods and services that might be purchased. The expenditures that are most relevant for retail-trade are those on food and beverages, clothing and footwear as well as furnishings and equipment.

As can be seen in Table 1, people aged 24 or less spent most of their net income for consumption purposes in 2008. The age groups 65 to 70 years and 70 to 80 years used more than 80% of their disposable income for consumption as well. Partly this can be explained by the somewhat smaller income levels compared to the other households. The lower the disposable income, the more of it has to be spent for the basic living stuff. Especially, when the principal earner is younger than 25 years the corresponding household has only half of the average net income available (see Table 2). Together, those households contribute just 1.1% to the overall net income in NRW. A huge part of the disposable money (22%) is spent on food and beverages, clothing and footwear and furnishings and equipment, somewhat more than by the other age groups. The biggest part goes to groceries. In absolute terms, the households with the highest net income purchase more retail trade relevant goods, though. This is due to the fact that on the one hand the households are bigger (kids) and start to settle down with the need of furniture as well as domestic appliances and on the other hand are able to consume higher quality goods.

With regard to demographic change in NRW the consumption behaviour of the households aged 55 up to 64 or 80 and older is of special interest. 2020 the first will represent 15.3% of the society, the second biggest part (see Table 3). This means an increase of 31% between 2008 and 2020 or 2.3% on average per year. With regard to their consumption behaviour, these households spent 19.3% of their disposable net income for retail trade relevant consumption in 2008. This implicates 619 Euro per household and month which is less than what is spent by the two preceding age groups (35 to 45 and 45 to 55) but more than the average household purchases (579 Euro). Thus the consumers between 55 and 65 will be of increasing interest to retail trade. The group of 80 years and older even grow with 3.0% p.a. but continue to represent less than 10% of the North Rhine-Westphalian inhabitants which is still the second smallest group then. With regard to retail trade consumers being 80 and older are not in the focus. Their purchasing power is low due to the second smallest net income being only 77% of the average net income in NRW. Consequently, the amount paid for food and beverages, clothing and footwear as well as furnishing and equipment is with 374 Euro per month and household below the average and in relation to the disposable income represents the smallest share compared to the other age groups. The third kind of clientele which is also growing but at a smaller rate, is that from 25 years up to 35 years. 12.9% will be in that age in 2020, 9% more than 2008. In contrast to the oldest consumers they have 82% of the medium net income available and therefore purchase more retail-trade-relevant goods.

Table 1: Share of retail trade relevant consumption purposes and all purposes on net income

Age groups	Food and beverages	Clothing and footwear	Furnishings and Equipment	Retail trade relevant consumption purposes	All consumption purposes
Under 25	13.2%	5.6%	3.1%	22.0%	87.3%
25 - 35	10.7%	4.1%	3.9%	18.7%	77.4%
35 - 45	10.9%	3.9%	4.2%	19.0%	72.5%
45 - 55	11.2%	3.7%	3.5%	18.4%	73.2%
55 - 65	11.2%	3.5%	4.6%	19.3%	77.2%
65 - 70	11.8%	3.4%	4.1%	19.3%	84.4%
70 - 80	11.7%	3.4%	3.9%	19.0%	85.4%
Over 80	10.1%	2.5%	3.1%	15.8%	79.6%
All	11.2%	3.7%	4.0%	18.9%	76.6%

Source: Statistical Office NRW (2010), own calculations

Table 2: Level and allocation of net income

Age groups	net income per household and month	proportion to average net income	share on aggregate net income
Under 25	1505	49.9%	1.1%
25 - 35	2478	82.1%	9.0%
35 - 45	3366	111.5%	23.0%
45 - 55	3495	115.8%	27.6%
55 - 65	3154	104.5%	18.6%
65 - 70	2708	89.7%	8.1%
70 - 80	2481	82.2%	9.9%
Over 80	2325	77.0%	2.7%
All	3019	100.0%	100.0%

Source: Statistical Office NRW (2011), own calculations

Table 3: Population in NRW 2008 and 2020

Age groups	Population (in persons)		absolute change	average annual change
	2008	2020		
Under 25	4667610	4086745	-1.6%	-0.1%
25 - 35	2085453	2273072	-12.4%	-1.1%
35 - 45	2791386	2192643	9.0%	0.7%
45 - 55	2765810	2544056	-21.4%	-2.0%
55 - 65	2054522	2700090	-8.0%	-0.7%
65 - 70	1071276	1047255	31.4%	2.3%
70 - 80	1646276	1576188	-2.2%	-0.2%
Over 80	878305	1247242	-4.3%	-0.4%
All	17960638	17667292	42.0%	3.0%

Source: BBSR (2009), own calculations

Summarising, the future prospects for retail trade in NRW are opposed. The most significant consumers by earning more than the average net income are the medium aged households (35 to 45, 45 to 55 and 55 to 65). In absolute terms they spend most due to household size (children), settlement (furnishings and home appliances) and purchasing power. A drawback is that only parts of the prosperous groups, i.e. the households with members aged 55 up to 65 will grow in numbers. The other important groups will shrink

most probably. Groups that spent less for retail trade relevant consumption purposes will gain influence instead. Therefore, the overall economic effect for retail trade is unclear, especially if one likes to evaluate special locations. For being able to assess the demographic effects the projection of the consumption behaviour into the future becomes important. Considering regional discrepancies a look at a more detailed level (NUTS 3) will also be interesting.

3 CALCULATION OF THE RETAIL-TRADE-RELEVANT PURCHASING POWER ON NUTS 3 LEVEL

In the following section a description of the data, the model surroundings and the calculation procedure is given. Special events like the economic crises in 2009 are not addressed, though they are considered in the projection.

3.1 THE BASIS – DATA AND MODEL

Data from the Household Budget Survey (HBS) 2008 for NRW is used.¹ The sample gives information about the income and expenditure of private households differentiated by socioeconomic attributes and is conducted on a five-year-basis. The participation is voluntarily and comprises 60 thousand households. Accurate and reliable results are granted by plausibility checks. The Federal Statistical Office (2011) also states, that “representative data are obtained for almost all households since all social groups are covered by a quota plan and the results obtained are expanded on the basis of the relevant microcensus figures.” Though, some parts of the population are neglected as “the EVS does not provide data on persons living in communal establishments and institutions [...] The EVS neither provides data on households with a monthly net income of Euro 18,000 or more as the number of these households participating in the survey is usually not sufficient to provide reliable information on their standards of living.”

Comparing overall consumption expenditures and total disposable income with that provided by National Accounts (NA), the values deviate. Next to the restriction indicated above, HBS also shows differences to NA in the way, that private organisations without purpose of gain (NGOs, unions etc.) and payments in kind are neglected. Furthermore, in NA the full price at the point of purchase is included irrespective of the way of financing (e.g. by taking a loan) and imputed rents are calculated. Expenditures abroad and sales between households are integrated in HBS but not so in NA. The highest impact on the discrepancy between HBS and NA has most probably the missing information of rich households and imputed rents as well as the low coverage of expenses for “miscellaneous goods and services”.

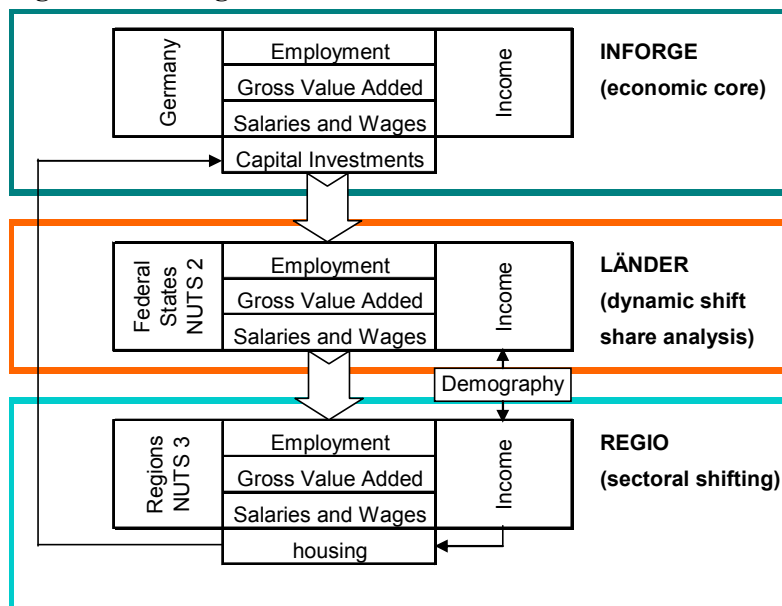
In this study, the data was not adjusted to the absolute level of National Accounts data so that the resulting time series based on HBS differ in aggregate values from NA’s consumption expenditures. The adjustment was not necessary as both time series are not directly compared with each other. Furthermore, the results aimed at (retail trade relevant

¹ Einkommens- und Verbrauchsstichprobe (EVS)

purchasing power on NUTS 3 level for different age groups) can be solely derived from HBS and have no corresponding values in NA. Both time series show the same development though. This is due to the fact that the consumption and income structure extracted from HBA is projected by growth rates from the model PANTA RHEI REGIO II which uses NA data.

PANTA RHEI REGIO II is an equation system that projects the economic development of 413 regions on NUTS 3 level until the year 2025 and was applied in several studies (see e.g. Distelkamp et al. 2011, Stöver et al 2010, Distelkamp and Ulrich 2009). It is an extended version of the macro-econometric simulation and forecasting model INFORGE and its data modules SPARTEN and LÄNDER.² The ideas of full integration and bounded rationality are maintained. The data sets consist of national statistics, mainly (regional) National Accounts. The regionalisation combines both top-down and bottom-up approaches, i.e. each sector of the economy is modelled in great detail and the macroeconomic aggregates have to be calculated by explicit aggregation within the model. Thus, the model incorporates demographic and economic developments and disaggregated economic structures. The population development is given exogenously by the regional forecast study “Raumordnungsprognose 2025” of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR 2010). A schematic overview of the construction design of PANTA RHEI REGIO II is given in Figure 1.

Figure 1: Design of the model PANTA RHEI REGIO II



Source: GWSmbH

Based on the economic structure and the interdependencies between twelve economic sectors, the gross value added on NUTS 2 level (16 federal states) is calculated. Connections and interrelations between the different states as well as shifts in economic structures are considered.

² An overview of the model INFORGE can be found in the annex. For detailed information see Moennig (2011) or Schnur and Zika, G. (2009).

The projection of the development on NUTS 3 level is carried out in a similar way. Due to the higher level of detail and available data only seven economic sectors are distinguished. The resulting regional projections of basic economic indicators are linked to the nation-wide developments (structural and technological change). Econometric shift-share approach is applied to the most detailed structural data available. Furthermore employment and productivity were linked to the regional development of disposable income (via compensation of employees and distributional income effects). Moreover a bottom-up approach was used for the modelling of housing and construction. The changes in population and total number of private households were implemented.

For the problem at hand the projection of disposable income and the demographic development are of special interest. They were used for the calculation of the retail trade relevant purchasing power described below.

3.2 CALCULATION PROCEDURE

First, retail trade relevant purchasing power has to be defined. The concept purchasing power indicates the value of money, i.e. goods and services that can be purchased by one unit of it. Often it is equalised with disposable income and can be expressed in real as well as current prices. Retail trade relevant purchasing power is that part of net income that private households plan to spend for food and beverages, clothing and footwear as well as furnishings and equipment. The amount depends on the consumption structure of the different age groups, their income and their weight expressed in number of persons.

Based on that concept, the calculation procedure is as follows. Population data consisting of eight age groups and a bulk sum on NUTS 2 and NUTS 3 level for North Rhine Westphalia (NRW) from the coordinated population projection of BBR has been integrated in the model PANTA RHEI REGIO II.

In a next step, disposable income of the different age groups is generated on NUTS 2 level subject to the development of number of people in each group. More precisely, the components of net income - gross income, income from assets and rent and lease, income from public and non-public transfer payments less taxes and social security contribution - grow with the same rates as the equivalent quantities of the NA. Variation is induced by the changing composition of the age groups and their specific income structure. The result is a time series for disposable income by age groups in NRW from 2008 to 2025.

Furthermore, the share of 12 consumption purposes on disposable income by age groups was calculated for the year 2008. The share is assumed to be constant for the remaining years until 2025. The size of consumption expenditures changes according to the change in disposable income. One now could analyse the impact of demographic change on consumption and the retail trade relevant purchasing power for NRW.

To get a more detailed look, the age dependant consumers' behaviour and purchasing power has to be further disaggregated on NUTS 3 level. Difficulties arise as the number of available information and data reduces enormously with higher levels of disaggregation. Thus, in order to receive the necessary information, more simplifications have to be accepted.

Starting with the income side, disposable income according to different age groups is calculated by using the ratio of an average household's disposable income on NUTS 3 to

NUTS 2 level. In combination with the age dependant disposable income on NUTS 2 level and the number of persons in each age group on NUTS 3 level one gets the relevant income quantities.

Again, taking the share of consumption purposes calculated before on NUTS-2-level-net income, information on consumption expenses on NUTS 3 level for different age groups results. Finally, the retail-trade relevant expenditures are the sum of the amounts spent for food and beverage, clothing and footwear as well as furnishings and equipment.

4 THE RETAIL-TRADE-RELEVANT PURCHASING POWER IN 2020

In the next sections the results calculated for NRW and its regions are presented. The focus is on the year 2020 which is compared with the actual situation in 2008. The outcome is given in current prices leaving price effects unstudied. As the consumption patterns of each age group stays the same during the observation period, cohort effects, i.e. generation specific behaviour that transverse the age groups with the generation, are not considered as well.

4.1 THE CASE FOR NORTH RHINE-WESTPHALIA

Having in mind the opposing positive and negative demographic developments described in chapter 2 a first result is that the positive effects prevail. As can be seen in Table 4 the retail-trade-relevant expenditures in NRW will be 15% higher in 2020 than in 2008 and sum up to 68 billion Euro. Thus, the expenses grow by 1.2% p.a. in average. One has to bear in mind that the results are expressed in current prices. The growth rates might not be sufficient to compensate inflation. The households that foster the current growth are those aged 80 years and more, aged between 55 and 65 years and between 25 and 35 years. Their average annual growth rates are 4.1%, 3.6% and 1.9% respectively. Opposed to that is the group from 35 to 45 years contributing 0.8% p.a. less to retail trade. Consumers under 25 years do not change their amount spent for retail-trade-relevant purposes over the years. Per capita expenses increase independent of the age of the household members. This is due to a growing disposable income level for all types of income components. Thus, the influence and impact of the diminishing number of persons with their consumption specific behaviour due demographic changes is much higher.

Table 4: Development of retail trade relevant consumption in NRW

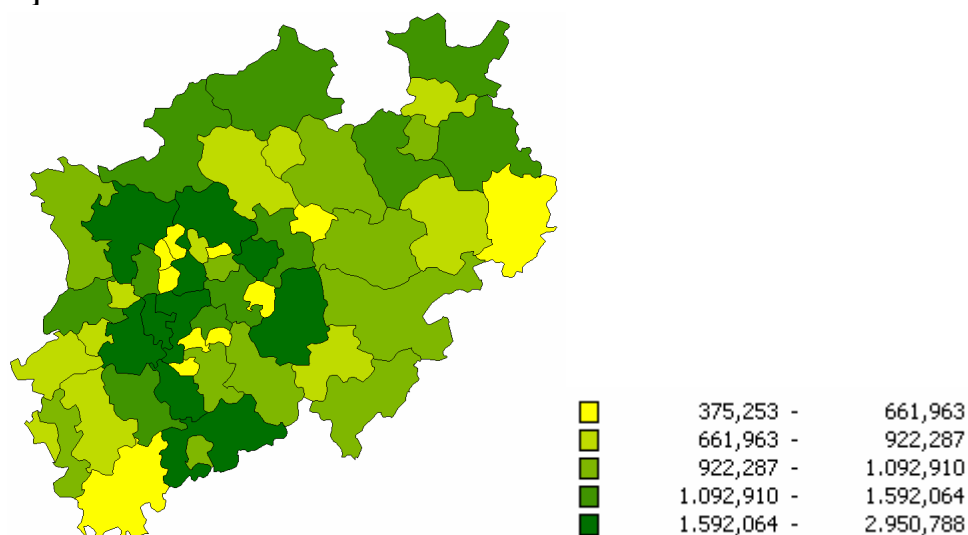
Age groups	Retail trade relevant consumption expenditure in million EUR		Absolut change	Average annual change
	2008	2020		
Under 25	754.0	753.2	-0.1%	0.0%
25 - 35	5261.7	6560.8	24.7%	1.9%
35 - 45	13692.0	12366.2	-9.7%	-0.8%
45 - 55	15939.3	16900.7	6.0%	0.5%
55 - 65	11253.4	17106.9	52.0%	3.6%
65 - 70	4925.6	5595.3	13.6%	1.1%
70 - 80	5907.2	6562.8	11.1%	0.9%
Over 80	1310.5	2131.0	62.6%	4.1%
All	59113.6	67977.0	15.0%	1.2%

Source: GWSmbH

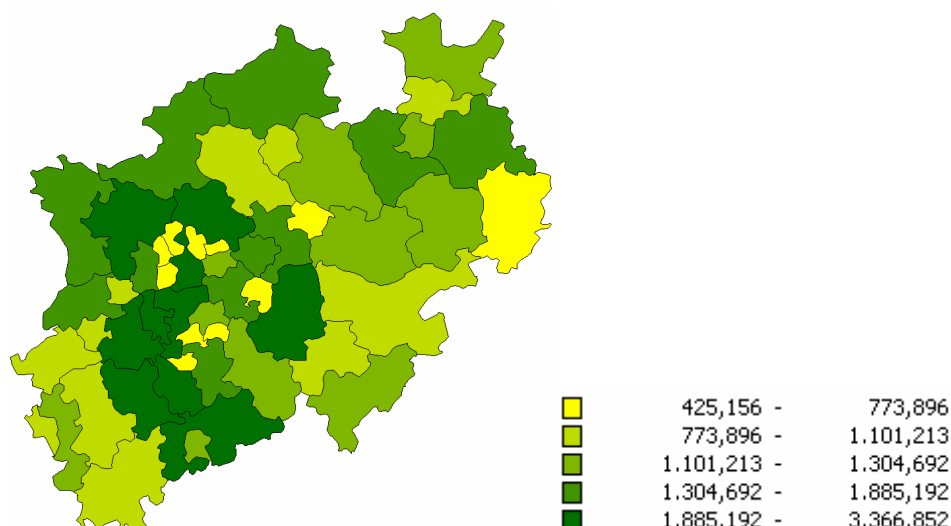
4.2 THE DEVELOPMENT ON REGIONAL LEVEL

With regard to different consumption behaviour depending on age the situation in the individual regions within NRW might be quite divers. The regions on NUTS 3 level having the highest retail-trade-relevant expenditures in 2008 as well as 2020 are Cologne, Rhein-Sieg-Kreis, Mettmann, Recklinghausen and Düsseldorf (see Figure 2). Here, the population in each region spent over 1.9 million Euro in 2008 and will rise the amount over 2.2 million Euro till 2020. In comparison the population of the regions Bottrop, Remscheid, Herne, Höxter and Leverkusen spent less than 0.5 million Euro in 2008. This amount will not rise much till 2020 so that these regions remain the ones with the lowest retail-trade relevant purchasing power.

Figure 2: Retail trade relevant expenditures on NUTS 3 level in 2008 and 2020 [Mill. EUR]³



³ The figure's legend displays numbers in German notation with decimal comma instead of point. The groups are equally distributed. This applies to all maps in this paper.



Source: GWSmbH

The contrast between the regions results from differences in income levels and numbers of inhabitants. The development of net income, population size and purchased retail-trade-relevant goods is much more similar than the absolute levels show. The number of persons more or less stagnates in all indicated regions (see Table 5). While population in Rhein-Sieg-Kreis and Düsseldorf still grow very slowly by 0.4% and 0.1 % p.a. the other regions loose inhabitants by rates between -0.1% and -0.6% per year. In Cologne population stays constant. The groups that are strongly growing in all regions are those between 55 years and 64 years and 80 years and older. The first one has average annual growth rates around 2%, the second between 2% and 4%.

Table 5: Average annual demographic change [% p.a.] between 2008 and 2020

	Age groups								
	All	Under 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 70	70 - 80	Over 80
Top 5 - highest level of retail trade relevant expenditures									
Cologne, Kreisfreie Stadt	0.0	-0.1	-0.3	-1.2	0.1	1.8	-1.4	-0.2	2.7
Rhein-Sieg-Kreis	0.4	-0.9	1.3	-1.4	-0.1	2.8	-0.1	0.9	3.9
Mettmann, Kreis	-0.3	-1.5	1.0	-2.4	-0.6	1.8	-1.6	0.0	4.1
Recklinghausen, Kreis	-0.5	-1.8	0.5	-2.5	-1.1	1.7	0.5	-0.4	2.6
Düsseldorf, Kreisfreie Stadt	0.1	0.0	0.0	-1.3	0.5	1.6	-1.5	-0.5	2.5
Top 5 - lowest level of retail trade relevant expenditures									
Bottrop, Kreisfreie Stadt	-0.4	-1.5	0.8	-2.2	-1.2	1.7	0.6	-0.6	2.5
Remscheid, Kreisfreie Stadt	-0.6	-1.3	0.7	-2.4	-1.5	1.3	-1.8	-0.7	2.5
Herne, Kreisfreie Stadt	-0.5	-1.5	0.5	-2.6	-1.0	1.6	0.0	-0.8	1.7
Höxter, Kreis	-0.5	-1.8	0.2	-2.9	-1.3	2.8	0.6	-0.9	2.6
Leverkusen, Kreisfreie Stadt	-0.1	-0.8	1.1	-1.9	-0.6	2.2	-1.5	-1.5	4.1

Source: BBSR (2009), own calculations

Regarding the changes in income shown in Table 6 the households of the indicated regions can expect an average rise of around 1% p.a. between 2008 and 2020. Exceptions are those living in Remscheid and Rhein-Sieg-Kreis showing growth rates of 0.5% p.a. and 1.8% p.a. Again, the age groups with the highest increasing net incomes are those indicated before with average annual rates between 3% and 5% when aged over 80 years, between 3% and 4% when aged 55 to 65 years and between 1% and 2% when aged 25 to 35 years.

Table 6: Average annual change in net income [% p.a.] between 2008 and 2020

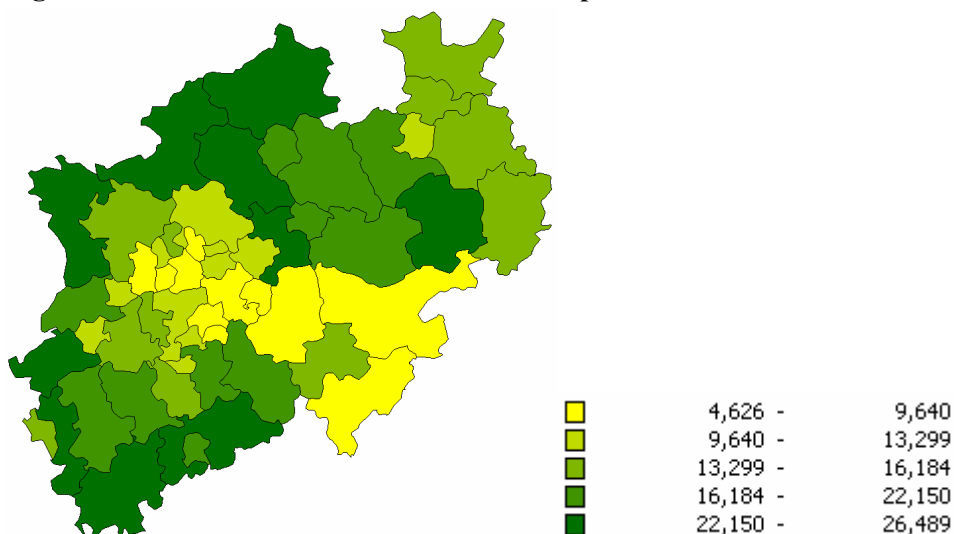
	Age groups								
	All	Under 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 70	70 - 80	Over 80
Top 5 - highest level of retail trade relevant expenditures									
Cologne, Kreisfreie Stadt	1.1	0.9	0.7	-0.1	1.2	3.0	-0.2	1.0	3.7
Rhein-Sieg-Kreis	1.8	0.3	2.5	-0.2	1.1	4.1	1.2	2.2	5.1
Mettmann, Kreis	1.0	-0.4	2.1	-1.2	0.5	2.9	-0.4	1.2	5.2
Recklinghausen, Kreis	0.8	-0.7	1.5	-1.4	0.0	2.9	1.7	0.7	3.7
Düsseldorf, Kreisfreie Stadt	1.1	0.9	1.0	-0.2	1.6	2.7	-0.4	0.6	3.4
Top 5 - lowest level of retail trade relevant expenditures									
Bottrop, Kreisfreie Stadt	1.0	-0.3	2.1	-0.9	0.1	3.0	2.0	0.7	3.8
Remscheid, Kreisfreie Stadt	0.5	-0.3	1.7	-1.3	-0.4	2.5	-0.6	0.5	3.6
Herne, Kreisfreie Stadt	0.9	-0.2	1.8	-1.3	0.4	3.0	1.4	0.6	2.9
Höxter, Kreis	1.1	-0.6	1.5	-1.5	0.1	4.2	2.0	0.5	3.9
Leverkusen, Kreisfreie Stadt	0.9	0.1	2.1	-0.9	0.4	3.3	-0.5	-0.5	5.0

Source: GWSmbH

As retail-trade relevant expenses depend directly on disposable income, not only the groups with the highest absolute levels but also those with the highest income growth are of special interest. Thus, the prospective revenues for retail-trade in one location depend on the number of people in the most prosperous age groups living there in future. Regions that show only low increases are less interesting or even indicate uneconomical areas. The highest increases in retail trade relevant expenses can be expected in Paderborn, Coesfeld, Rhein-Sieg-Kreis, Borken and Kleve. Figure 3 shows that the growth rates range from 22.8% in Kleve to 26.5% in Paderborn. The high growth rates can be mainly explained by the fact that the number of persons living there increasing more strongly in the next decade than in other regions. Especially the group between 55 and 65 years becomes larger having on average 4% to 5% more net income per year. The development of the consumers aged 80 years and older is quite similar. On a somewhat smaller pace the increase of the age group from 25 to 35 years contributes demand and purchasing power to the retail trade as well. Its income will grow by around 2.5% p.a. In contrast to the other regions, Paderborn, Coesfeld and Kleve also have a growing number of persons aged from 65 to 80 who support demand.

Opposed to that are Hagen, Remscheid, Gelsenkirchen, Duisburg and Mülheim a.d.R. staying behind with the lowest growth rates for retail-trade relevant goods and services. This is due to an overall reduction in population between 2008 and 2020 that range from -0.5% p.a. to -0.8% p.a. The only comparably small rise in number of people of the age groups 55-56, over 80 and 25-35 years cannot compensate the high decrease in the other age groups. So, the average annual increases in income over all households lie only between 0.4% and 0.6% even suggesting a reduction in real terms. Looking at the age groups worse off, consumers under 25 years, between 35 and 45 years and between 45 and 55 years have annually lower available net income. It shrinks in average about 0.3% p.a., 1.3% p.a. and 0.3% p.a. respectively. The contribution by the consumers' income aged from 55 to 65, 80 and more as well as from 25 to 35 is lower than in other regions not relieving the retail trade's situation.

Figure 3: Growth of retail trade relevant expenditures between 2008 and 2020 [in %]



Source: GWSmbH

Table 7: Average annual demographic change [% p.a.] between 2008 and 2020

	Age groups								
	All	Under 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 70	70 - 80	Over 80
Top 5 - highest growth rates of retail trade relevant expenditures									
Paderborn, Kreis	0.3	-0.9	0.7	-1.2	-0.6	3.6	1.4	0.1	3.2
Coesfeld, Kreis	0.2	-1.4	1.0	-2.2	-0.4	3.5	1.5	1.0	3.7
Rhein-Sieg-Kreis	0.4	-0.9	1.3	-1.4	-0.1	2.8	-0.1	0.9	3.9
Borken, Kreis	0.2	-1.2	1.0	-2.2	0.0	3.7	1.0	-0.2	4.2
Kleve, Kreis	0.2	-1.2	1.3	-2.1	-0.2	3.0	1.2	0.6	3.3
Top 5 - lowest growth rates of retail trade relevant expenditures									
Hagen, Kreisfreie Stadt	-0.8	-1.5	0.7	-2.7	-1.7	1.3	-1.2	-1.5	2.3
Remscheid, Kreisfreie Stadt	-0.6	-1.3	0.7	-2.4	-1.5	1.3	-1.8	-0.7	2.5
Gelsenkirchen, Kreisfr. Stadt	-0.8	-1.6	0.5	-2.6	-1.6	1.4	0.0	-1.3	1.3
Duisburg, Kreisfreie Stadt	-0.5	-1.3	0.8	-2.1	-1.3	1.6	-0.5	-1.8	2.4
Mülheim a.d.R., Kreisfr. Stadt	-0.5	-1.5	1.0	-2.5	-1.2	1.4	-0.9	-0.9	2.6

Source: BBSR (2009), own calculations

Table 8: Average annual change in net income [% p.a.] between 2008 and 2020

	Age groups								
	All	Under 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 70	70 - 80	Over 80
Top 5 - highest growth rates of retail trade relevant expenditures									
Paderborn, Kreis	2.0	0.5	2.1	0.2	0.8	5.1	2.9	1.5	4.5
Coesfeld, Kreis	1.9	-0.2	2.2	-0.9	0.8	4.9	2.9	2.3	4.9
Rhein-Sieg-Kreis	1.8	0.3	2.5	-0.2	1.1	4.1	1.2	2.2	5.1
Borken, Kreis	1.8	-0.1	2.2	-1.0	1.2	5.0	2.3	1.1	5.3
Kleve, Kreis	1.7	-0.1	2.5	-0.9	1.0	4.2	2.5	1.8	4.4
Top 5 - lowest growth rates of retail trade relevant expenditures									
Hagen, Kreisfreie Stadt	0.4	-0.3	1.8	-1.5	-0.5	2.5	0.1	-0.3	3.4
Remscheid, Kreisfreie Stadt	0.5	-0.3	1.7	-1.3	-0.4	2.5	-0.6	0.5	3.6
Gelsenkirchen, Kreisfr. Stadt	0.6	-0.4	1.7	-1.4	-0.4	2.7	1.4	0.0	2.5
Duisburg, Kreisfreie Stadt	0.6	-0.2	1.8	-1.0	-0.3	2.7	0.7	-0.6	3.5
Mülheim a.d.R., Kreisfr. Stadt	0.6	-0.4	2.1	-1.4	-0.1	2.6	0.2	0.2	3.6

Source: GWSmbH

5 CONCLUSION

The highest potentials and revenues for retail-trade can be identified in the cities and especially in the metropolitan areas along the Rhine. The high density of people in 2008 as well as 2020 provides a solid basis for retail-trade relevant demand. Other positive developments can be expected in areas where the birth rate and the share of younger people in 2008 are comparably high. In 2020 those will be moved to the age groups with high net incomes and most probably gave birth to children as future consumers. They often live in more rural areas at the border of NRW. Less promising is the region around the Rhur, the formerly flourishing industrial area. High unemployment rates and low disposable income levels can be identified as the main problems. In future, this situation within NRW will consolidate and even worsen.

The general results for NRW can be translated to other German regions. Good prospects for retail-trade relevant expenditures can be prophesied in metropolitan areas and big cities such as Munich, Nuremberg, Stuttgart, Rhine-Ruhr (Cologne, Düsseldorf), Berlin, Sachsendreieck (Leipzig, Dresden, Chemnitz, Halle), Frankfurt-Rhein-Main etc. Retail trade in rural areas with young population like Cloppenburg, Emsland, Borken, Grafschaft Bentheim or Biberach can look to the future with confidence as well. In contrast, locations that are faced with only slowly increasing or even shrinking future demand are situated in regions where a lot of inhabitants have no job, are old, the fertility rate is low or the population is already decreasing. For example, this is the case for most parts of Sachsen-Anhalt and Mecklenburg-Vorpommern, the Bavarian Forest, Northern part of Schleswig-Holstein etc.

A more detailed picture could be interesting and is a possible subject for future work. Price effects might be of higher interest as well being not dealt with in this work. Most probably the low increases in some parts of NRW will be even negative when inflation is considered.

LITERATURE

- Statistical Office NRW (2010): Statistical working table 2.4.4 from EVS: Einkommen und Einnahmen sowie Ausgaben privater Haushalte 2008 nach Alter der Haupteinkommensbezieher und -bezieherinnen und Haushaltstyp. Glied.Nr.: 05 2.4.4 01 V. Dated: 28.09.2010.
- BBSR [Hrsg.] (2009): Raumordnungsprognose 2025/2050. Bundesinstitut für Bau-, Stadt- und Raumforschung, Berichte Band 29, Bonn.
- Distelkamp, M., Hohmann, F., Lutz, C., Ulrich, P. & Wolter, M.I. (2011): Blick in die Zukunft: Flächeninanspruchnahme bis 2020. Modellgestützte Projektion der Flächeninanspruchnahme in den Kreisen Deutschlands bis zum Jahr 2020. In: Bock, S., Hinzen, A. & Libbe, J. (Hrsg.): Nachhaltiges Flächenmanagement - Ein Handbuch für die Praxis: Ergebnisse aus der REFINA-Forschung, Berlin, S. 32-38.
- Distelkamp, M. & Ulrich, P. (2009): Sustainable settlement development - Assessing the effects of state measures in scenario analysis. Paper presented at the 15th International Sustainable Development Conference at the Utrecht University (Netherlands), July 2009, [GWS Discussion Paper 2009/9](#), Osnabrück.
- Federal Statistical Office (2011): Sample survey of income and expenditure (EVS). http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/EN/press/abisz/Einkommens_Verbrauchsstichprobe_e.templateId=renderPrint.psml. Dated:10.05.2011.
- Mönig, Anke: Product Tax Modelling – using the dynamic interindustry model INFORGE. Paper presented at the ECOMOD conference 2011 in Ponta Delgada, Azores.
- Schnur, P. & Zika, G. (Hrsg.) (2009): Das IAB/INFORGE-Modell – Ein sektorales makroökonomisches Projektions- und Simulationsmodell zur Vorausschätzung des längerfristigen Arbeitskräftebedarfs. IAB-Bibliothek 318, Nürnberg.
- Stöver, B., Szlachetka, R. & Ulrich, P. (2010): Der Einzelhandel und die für ihn relevante Kaufkraft im regionalen Fokus. [GWS Discussion Paper 10/3](#), Osnabrück.

ANNEX

THE MODEL INFORGE

The model INFORGE (INterindustry FORecasting GERmany) can be used for forecasting and simulations and was already applied in many different studies (see e.g. Mönnig and Stöver 2010, Ahlert et al. 2009; Meyer et al. 2007). A model comparison confirmed the ability to simulate even detailed scenarios (Eurostat 2008, p. 527ff., BMU 2002, p. 104). Furthermore it has been updated since 1996 on a yearly basis.

INFORGE consistently describes the annual inter-industry flows between 59 sectors, their contributions to personal consumption, government, equipment investment, construction, inventory investment, exports as well as prices, wages, output, imports, employment, labor compensation, profits, taxes, etc. for each sector as well as for the macro economy. The complete system of national accounts is integrated in the model.

Intermediate demand – endogenously explained and extrapolated to any point in time – is a key component of INFORGE. Intermediate demand is modelled using cost-push or autonomous technological progress, i.e. firms adapt their intermediate demand to price changes and innovation. As a result, the shares of intermediate consumption, salaries and wages as well as consumption of fixed capital in costs of production can vary. The varying material costs, personal costs and consumption of fixed capital formation to total production directly affect profit. The overall output of goods finally results from the sum of intermediate demand, final demand and balances of exports and imports of goods and services.

Being part of final demand, private consumption is modelled using 41 individual consumption purposes. Changes in consumption are determined by disposable income, which is adjusted for prices. The average price trend of individual consumption and relative prices are taken into account.⁴ Other explanatory variables are demographic trend, time trends etc.

The development of the labour market is often of public and political interest. Total number of employees as well as unemployment rates are well known parameters. The need to investigate labour market interdependencies in detail calls for thoughtful modelling. The labour market combines technological progress, changes in prices and wages, overall employment as well as development of working hours. It thus represents one of the core areas within the model, and has a main impact on the iteration method and the interdependencies within INFORGE. Raises in wages and salaries, mostly achieved by collective bargaining between unions and employees, change the cost structure and consequently influence the price setting behaviour of firms. This again triggers adapting processes in demand. Simultaneously, the price setting behaviour and changes in wages combined with demographic trends define labour demand. The number of employed persons in each economic sector therefore depends on the price adjusted gross annual wage

⁴ The relative price arises from the change of price for one good in relation to the average price trend. If one good gets more expensive compared to the average price of consumption the private household would generally reduce the share of that good in the whole consumption bundle. The price elasticities differ depending on the good and are empirically set.

rate of the same sector. A negative correlation between real wage and number of employees is assumed. Besides real wage, production is important, too, as an increase in production generally implies a larger labour input.

In the behavioral equations decision routines are modeled that are not explicitly based on optimization behavior of agents, but are founded on bounded rationality.

LITERATURE

- Ahlert, G., Distelkamp, M., Lutz, C., Meyer, B., Mönnig, A. & Wolter, M.I., 2009. Das IAB/INFORGE-Modell. In: Schnur, P. & Zika, G. [Hrsg]: Das IAB/INFORGE-Modell. Ein sektorales makroökometrisches Projektions- und Simulationsmodell zur Vorausschätzung des längerfristigen Arbeitskräftebedarfs. IAB-Bibliothek 318, Nürnberg, 15-175.
- Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU) (Hrsg.) (2002): Vierte und abschließende Stellungnahme des Beirats „Umweltökonomische Gesamtrechnung“, Wiesbaden.
- Eurostat (2008): Eurostat Manual of Supply, Use and Input-Output Tables. Luxembourg.
- Meyer, B., Lutz, C., Schnur, P. & Zika, G. (2007): Economic Policy Simulations with Global Interdependencies: A Sensitivity Analysis for Germany. *Economic Systems Research*, 19(1), pp. 37-55.
- Mönnig, A. & Stöver, B. (2010): Change in Private Consumption Expenditure and its Consequences for the Economy – How Important is the Purchase of Cars? In: Počs, R., Auziņa, A. & Ozoliņa, V. [ed.]: *Development and Applications of Multisectoral Macroeconomic Models*, Riga, pp. 75-98.
- Schnur, P. & Zika, G. (Hrsg.) (2009): Das IAB/INFORGE-Modell – Ein sektorales makroökometrisches Projektions- und Simulationsmodell zur Vorausschätzung des längerfristigen Arbeitskräftebedarfs. IAB-Bibliothek 318, Nürnberg.

