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The relationship between commuters and rural areas

A research about the relationship between the share of commuters in rural areas and the development of rural areas in the North of the Netherlands.

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Abstract

This research looks at the relationship between the share of commuters and the development of rural areas in the North of the Netherlands. Commuters can have either a positive or a negative correlation on the development of rural areas, which is displayed in this research by the average standardized household income and the average house prices in rural areas in Northern Netherlands. Firstly, a survey has been conducted to research what the socio-economic characteristics of the commuters in Northern Netherlands are, which might play an important role in the relationship between commuters and the development of rural areas. A limitation of this survey is that there were 55 respondents, which is a relatively small sample size. This means, even after the representative test, that no conclusions may be drawn for the whole population. However, this does not alter the fact that conclusions can be drawn for the respondents. According to the literature, distance might play an important role in the development of rural areas. The results of the Pearson correlations show that there is neither a correlation between the distance between work and home and the disposable income of the respondents, nor between the distance and the percentage that the respondents do their grocery shopping in the municipality they live in. This might be the result of the small sample size. Also, it might be the case that there is no supermarket nearby in the same municipality. However, there is a positive correlation between the distance and the level of education. The more highly educated commuters in the survey travel on average more kilometers to their work. In the end, it is not possible to draw conclusions on whether the socio-economic characteristics of the commuters play a role in the relationship between the share of commuters and the development of rural areas in Northern Netherlands. Additionally, data from the CBS are gathered to explore the relationship between the commuters and the house prices, and the standardized household income. To see what the relationship is between the share of commuters and the average standardized household income, and the average house prices on the different scales in the Netherlands, a Pearson correlation has been executed. The results show that on the scale of rural areas in Northern Netherlands, there is no correlation between the variables. Only when looking at different scales, a positive correlation between the variables appears.

Keywords: commuters, North of the Netherlands, socio-economic characteristics, rural areas

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Part I: Introduction

1.1 Background

Rural areas are becoming more and more integrated in the wider economic processes, primarily due to the fast changing information technology and globalization trends. Rural areas can benefit from the migration of urban areas to the outskirts, due to the congestion. Especially rural areas that are positively connected with the urban areas can benefit from this out-migration of urban areas. However, the nature of this benefit depends upon the integration of the persons located in rural areas that commute to urban areas (Bosworth and Venhorst, 2015). The interdependency of rural and urban areas exists through, among other things, people commuting from rural to urban areas (Partridge et al., 2007). Hereby, the question arises as to what the effect is of those commuters on the rural and urban areas.

For urban areas, this means that there is a greater inflow of labor due to the commuting, without the costs of living (Overman et al., 2010). This offers the possibility of growth in urban areas. However, this raises questions about how the benefits of growth in the urban areas reach rural areas. There could be negative effects from the commuters to rural areas; increased housing prices could be the result of people who move from urban to rural areas and commute back to urban areas. Especially the least mobile people in rural areas are affected by those negative impacts. The wages of those people are declining in relation to the growing urban area. In contrast, the commuters are earning an 'urban wage' and are expressing residential preferences to live in a rich rural region, increasing the costs of living for the least mobile people in rural areas (Bosworth and Venhorst, 2015).

There could also be positive effects of commuters in rural areas. For instance, the higher wages of the commuters can trickle down into the economic development of rural areas and positively affect rural businesses. This could happen through the increasing consumption demand of the commuters, but also through the inflow of innovation or investments in infrastructure between urban and rural areas (Bosworth and Venhorst, 2015). In the last two decades, there has been a significant increase in car ownership. By investing in the infrastructure between urban and rural areas, it might enhance the mobility of individuals living in rural areas, which were previously immobile (Roberts, 2000). The research of Roberts (2000) also shows that the ability to commute to employment in urban areas has significantly changed the economic opportunities of rural areas. Through commuting, urban employment markets have become more accessible, allowing people who live in one area to provide their labor services in another area.

Distance plays a major role in the relationship between urban and rural areas. As So et al. (2001) state, the rural areas that are isolated and located farther away from urban areas are mostly experiencing a decline in economic development and their population (Veneri and Ruiz, 2016). In general, the economic growth in rural areas is not keeping up the pace with the economic growth in urban areas (So et al., 2001).

Moreover, urban areas have important spillovers that might affect the economic growth in rural areas, indicated by rural areas that are nearby urban areas and have higher numbers of employment and population growth. These spillovers might also affect job

creation opportunities in rural areas. Additionally, rural areas that are located nearby urban areas could increase rural populations by providing housing and commuting opportunities. Households make a decision on where to live based on trade-offs between wages, commuting time and costs, and living costs (So et al., 2001).

However, most of the literature regarding the relationship between urban and rural areas is focused on the United States (Barkley et al., 1996). This leads to wonder whether this relationship is the similar in the Netherlands. In addition, the literature often disregards the role of the commuters from the research, while those commuters might actually play an important role in the development of rural areas. As Bosworth and Venhorst (2015) state, the nature of the benefit in rural areas from urban areas is dependent on the integration of the urban persons migrating to rural areas. Therefore, the next question that arises is, do the socio-economic characteristics of the commuters play a role in the development of the rural areas?

Therefore, this research will focus on the relationship between the share of commuters in rural areas and the development of rural areas in the North of the Netherlands. Subsequently, it will research what the role of the socio-economic characteristic of the commuters might be. As mentioned before, there could be either positive or negative effects for the rural areas. According to the Volkskrant (2017), the Dutch are a nation of commuters. Six out of ten employees in the Netherlands work in a different municipality than they live in. They commute approximately 22.6 kilometers to their work. This development is not new in the Netherlands. Over the past few years the number of commuters has increased. At the end of 2011, almost 56% of the employees commuted to their work in another municipality, which amounts to approximately 4.5 million people (CBS, 2013). In 2015, this percentage increased to almost 62%. Additionally, only 37% of the employees in the Netherlands worked and lived in the same municipality in 2015 (CBS, 2017). In figure 1, the commuting distances of the employees are visible. As is shown, in the West of the Netherlands, the Randstad area, the commuting distance is smaller compared to the rest of the Netherlands. For instance, 51% of the people living in Eindhoven work in the same municipality they live in, and in Amsterdam it is 66%. The Randstad area attracts commuters from all over country. According to the Volkskrant (2017), this is because Eindhoven, Rotterdam and Amsterdam offer jobs that are not available in the rest of the Netherlands. On the other hand, people living in Groningen, Friesland and Drenthe commute the largest distance to their work (Trouw, 2012). Those provinces also have a relatively high share of commuters (CBS, 2013). According to the CBS (2013), mainly big cities attract commuters who live in rural areas/municipalities.

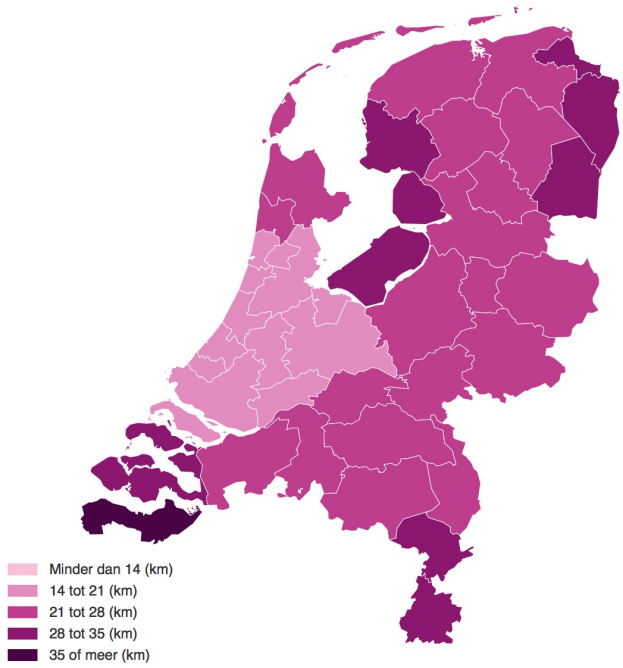

Figure 1: Commuting distances employees in 2016
Source: CBS (2018)

1.2 Research problem

Groningen, Drenthe and Friesland have a relatively high share of commuters living in these provinces. Those commuters could have a negative or a positive effect on the rural where those commuters are living (Bosworth and Venhorst, 2015). Therefore, this research will focus on the relationship between the share of commuters in rural areas and the development of rural areas in the North of the Netherlands.

As mentioned before, research about the interdependencies between urban and rural areas is abundant (Partridge et al., 2007). The theoretical relevance of this research is to address the gap in the literature, finding the relationship between the commuters and the development of rural areas. The relationship between urban and rural areas might have important policy implications for effective development strategies and managing urban sprawl. As Partridge et al. (2007) state, commuting could be an option for a rural development strategy. These joint rural-urban interests are also a fundamental basis for improving regional governance structures (Partridge et al., 2007). As Hughes and Holland (1994) state, a better understanding of the relationship between rural and urban areas would help policy makers in handling interrelated problems. Examples of those interrelated problems are declining economic opportunities in rural areas and losses in quality of life in urban areas with high rates of economic growth.

The aim of this research is to explore what the relationship is between the share of commuters and the development in rural areas in the North of the Netherlands. The development of rural areas will be researched by means of the standardized household income and the average housing prices in rural areas. As mentioned before, rural areas can experience either a positive or negative effects of the commuters. Therefore, it is interesting to research whether there is a positive or a negative relationship between the commuters and the housing prices and standardized household income in rural areas. Based on this, the following main question is derived:

'*What is the relationship between the share of commuters in rural areas and the development of rural areas in the North of the Netherlands?*

The secondary questions that logically follow this question are:

- In which ways could urban areas affect rural areas?
- What are the socio-economic characteristics of the commuters in the North of the Netherlands?
- What is the relationship between the number of commuters and the housing prices, and the standardized household income (in rural areas) in the (North of the) Netherlands?

To research the second secondary question, a survey will be conducted. This survey will include, among others, the following socio-economic characteristics: age, education, disposable household income, housing type, type of employment and where the respondents do their grocery shopping.

To research the last secondary question, secondary data will be used. In this part, there will be descriptive comparisons/analysis of tables of the data for three different years, 2014 to 2016. This data makes it possible to explore what the housing prices and standardized income are in the rural areas. After collecting the data, a Pearson Correlation will be done in the program SPSS. This analysis will reveal the relationship between the number of commuters and the average housing prices, and the average standardized household income.

1.3 Structure of the thesis

In this research, part II will show the theoretical framework. Herein it will show the different ways in which urban areas could affect rural areas, which will answer the first secondary question. Besides, this part will also show information about commuters and answers questions like: Do commuters earn a higher income? To which areas are commuters attracted to commute? Part III will show the methodology of this research, which will explain how the data is gathered and how it will be analyzed. Next to that, it will also show some ethical issues and it will explain some definitions of constructs that are used in this research. Additionally, part IV will show the results of the research. Firstly, it will show the results of the survey. Secondly it will show the results of the analysis of the data of the CBS. This part will answer the second and third secondary questions. Lastly, part V will show the conclusions that can be drawn from this research.

Part II: Theoretical framework

2.1 Urban and rural linkages

As Barkley et al. (1996) state, recent changes in industrial structures, regulations, organizations and markets favor the location of economic activities in urban areas over rural areas. The attractiveness of urban areas is becoming more important, due to the spread of new production methods, like computerizations, product specialization and technology advancements. Hereby, the importance of proximity to skilled labor, suppliers and markets is increasing as well. Therefore, urban areas that adopt these innovative organizations and technologies are becoming more important (Barkley et al., 1996). On average, urban areas of OECD countries record higher performances in terms of GDP per capita and population growth rate, compared to the rural areas (Veneri and Ruiz, 2016).

However, rural and urban areas are interdependent. This interdependency exists through commuting, population migration and firms and households that move out of urban areas to rural areas because of urban congestion and the high costs (Partridge et al., 2007). Urban areas can have either a positive or a negative effect on rural areas. This is also called spread and backwash effects. Hirschman (1958) and Myrdal (1957) introduced the spread-backwash concept in the 1950s. Spread and backwash effects have been used to describe the effects of urban growth on the rural areas (Partridge et al., 2007).

2.1.1 Spread effects

On the one hand, rural areas that are well linked to urban centers may experience population- and job growth resulting from urban agglomeration economies. Besides, population and employment growth in rural areas can also be the result of people fleeing urban congestion and therefore are looking for rural amenities. However, it can also be because of firms who move to nearby rural areas where land- and labor costs are lower while keeping access to the urban center. This is also called decentralization (Partridge et al., 2007).

The spread effect is defined as the positive effects from urban areas on rural areas, as the rural areas share in the growth and wealth of the urban areas (Myrdal, 1957). Spread effects include the diffusion of investment, innovation and growth attitudes from urban areas to rural areas (Hughes and Holland, 1994). In most cases, spread effects happen when rural population/employment growth originates from urban growth. It does not matter whether it comes from agglomeration economies or decentralization. It is expected that spread effects only affect rural areas that are close to urban areas (Partridge et al., 2007).

2.1.2 Backwash effects

On the other hand, due to growing economic activities in urban areas, rural populations and employment may decline. Households from rural areas may be attracted to migrate to growing urban areas to seek employment opportunities and access to urban services and amenities. Besides, in urban areas are agglomeration benefits, which can attract firms in rural areas to move to the urban areas (Partridge et al., 2007).

The backwash effect is defined as the negative effects from the economic growth of urban areas on the economic development of rural areas. Backwash effects include the

migration of the more skilled and trained people and financial capital moving from rural areas to the urban areas. Rural areas therefore could face depopulation and capital shortages (Hughes and Holland, 1994). As Veneri et al. (2012) show, higher educated people are relatively more likely to move to urban areas. In addition, higher educated people are relatively more likely to work in urban areas with high economic density and productivity. A reason for this movement is because the wages in urban areas are higher (Veneri et al., 2012). For those rural areas, where mostly young and higher educated people are moving out, it is a significant concern for economic development (Bosworth and Venhorst, 2015). This is in line with the research of Verneri and Ruiz (2016), where they show that the rural to urban migration can be selective. Especially younger people with higher levels of education and skill move from rural to urban areas. As a result, this might accelerate the ageing problem in rural areas. The backwash effects may occur when the maximum commuting distance, or the maximum distance from which goods and services can be easily exchanged with the urban market, are exceeded (Partridge et al., 2007).

In the research of Partridge et al. (2010), they show that when jobs in rural areas are growing, it will reduce the out-commuting. However, the job employment growth in nearby urban areas remains the largest contributor to growth in rural areas. Even with growing job accessibility, selective out-migration remains an important demographic force for rural areas that experience spread effects (Corcoran et al., 2010).

Backwash effects can emerge for different reasons. Firstly, if the distance from a rural area to an urban area is too long, rural workers may decide to migrate to the urban area. Secondly, this is also the case when the general provision of public services is too low in rural areas. In addition, public investment in for example infrastructure can be relatively more concentrated in urban areas where demand is higher. Therefore, the more innovative firms tend to move from rural to urban areas to benefit from the agglomeration benefits and bigger labor markets. Overall, rural areas that are further away from urban areas, which have a smaller economic size, which have a 'poor' infrastructure, and which have a large redundant labor force, are more likely to experience backwash effects (Veneri and Ruiz, 2016).

2.2 The net effects of the spread and backwash effect

As Myrdal (1957) states, the net effects of the spread and backwash effect will determine whether the urban area positively or negatively affects the rural area. The size and the geographic extent of the spread and backwash effects will depend on the characteristics of the rural and urban areas. Those characteristics are among others, the governance structure, the ease of transportation, communication access and the nature of economic linkages and amenities. The size of the rural area and the distance from rural to urban areas will be important in determining the net spread/backwash effects (Partridge et al., 2007). In a research of Chen and Partridge (2013), they found that medium-sized cities yield spread effects, while larger urban cities yield backwash effects.

At the local level, the nature and scope of rural and urban interactions is influenced by several factors. Those factors range from geographical and demographic characteristics, to farming systems and to the availability of infrastructure which link the rural area to the urban area. Local governments can play an important role in supporting the rural

and urban relationship to be positive (Tacoli, 2003). At the global level, the liberalization of trade and production has changed the rural and urban linkages. The increased availability of imported manufactured and processed goods, influences the consumption patterns in rural and urban areas. Those imported goods are mostly cheaper than locally produced goods. Therefore, local manufacturers and processors can be affected negatively (Tacoli, 2003).

2.3 Distance between urban and rural areas

The relationship between rural and urban areas located in proximity is usually very complex; both spread and backwash effects can occur. The dominance of either effect depends on the specific features of the region and on the nature of the linkages between different places. These linkages are strongly influenced by distance (Veneri and Ruiz, 2016). Barkley et al. (1996) researched the spread and backwash effects in eight regions in the United States. They concluded that rural areas close to urban areas are experiencing spread effects, while rural areas that are located farther away are experiencing backwash effects. Thus, distance plays an important role in the relationship between urban and rural areas. As Partridge et al. (2008) state in their research, distance is a key factor in employment and population growth in rural areas. Shorter distances between firms could result in advantages for urban areas such as agglomeration of economic activities, which results in higher wages. However, when the distance increases from the urban area, the wage effects attenuate. On the other hand, the labor demands in rural areas are weaker compared to urban areas. When offsetting outmigration of labor from rural areas to urban areas, the wages could increase in the rural areas (Partridge et al., 2008).

When urban areas experience agglomeration economies, a greater distance from them could negatively affect the profits and labor demand in rural areas. This could result in a decline in employment, which result in increasing poverty rates (Partridge et al., 2008). An increase in distance from rural areas to urban areas could also limit the labor mobility. This is due to the increased costs of commuting because of the distance. This leads to higher poverty in rural areas that experience declines in labor demand. Distance can reduce labor mobility because of related information and relocation costs, both financial and non-financial (Partridge et al., 2008). Also, information costs regarding the job opportunities increases with distance. When those costs are too high, households in rural areas may then only search in labor markets similar to the original market, which likely excludes them from searching in urban areas (Partridge et al., 2008).

Partridge et al. (2008) conclude in their research, that better access to urban areas is playing an important role in the growth of rural areas. Due to the better access, stronger interregional input-output and trade linkages exist and it is easier to obtain urban amenities and services.

In this research, the distance variable will be applied in the results of the survey. The respondents are asked how many kilometers they travel to their work and back, and this variable is used as the distance variable. As Barkley et al. (1996) state, the rural areas closer to urban areas experience spread effects. To test this statement, the relationship between the distance from the respondents' home and work, and their education level, income and the percentage that the respondents do their grocery shopping in the municipality they live in, will be researched.

2.4 Commuters

As mentioned before, the number of commuters has been increasing over the past few years (CBS, 2013). Those commuters mostly commute from rural areas to the big cities/urban areas. As Ganning et al. (2013) state, commuting is a key delivery mechanism of spread effects. Commuting is defined as regular traveling between home and work (Haas and Osland, 2014).

It is assumed that households choose their residential location and work location in such a way that their utility is maximized. Residents and commuters are attracted to an area where there are high wages. However, when housing prices are high, it will reduce the incentives to live in that area. In addition, if commuting costs are increasing, the incentive to commute will decrease. These findings suggest that longer commuting distances requires higher wages, to leave a worker better off, instead of working in the place they live in. Areas that have higher housing prices require higher wages to meet a worker's opportunity utility at other residential locations. Otherwise, the wages must exceed those in other labor markets sufficiently to induce people to commute (So et al., 2001).

In general, rural areas have a lower population density compared to urban areas. If higher population density leads to higher land prices, it could be expected that housing prices are higher in urban areas compared to rural areas (So et al., 2001). Also, the wages differ between the two areas. As mentioned before, the wages in urban areas are higher than in rural areas (Veneri et al., 2012). Therefore, commuters have a higher wage than non-commuters (So et al., 2001).

So et al. (2001) conclude that older households are less likely to commute. Those people also prefer to live in rural areas instead of urban areas. Households with children prefer to live in rural areas as well. Having children does not have a significant impact on the probability of commuting. Additionally, So et al. (2001) conclude that people with a higher education level are more likely to live in urban areas compared to lower educated people. This is in line with the research of Partridge et al. (2007), where they state that especially younger people with higher levels of education and skill migrate from rural to urban areas. However, the higher educated people are less likely to commute when they live in rural areas (So et al., 2001).

People who are living in rural areas and work in urban areas trade off higher wages for the 'unpleasant' commuting time. The people who live and work in rural areas trade off lower housing prices for lower wages in the local labor market. The results of the research of So et al. (2001) suggest that improvements in transportation, which results in lower commuting time and costs, will increase rural populations and increase the number of commuters from rural to urban areas. Lastly, people who live in rural areas are willing to commute one hour to the urban area for work (So et al., 2001).

Commuters might have a positive role in the local market. An example hereof is that they expend their generated income in the local market (Ottaviano, 2008). As So et al. (2001) state, commuters have a higher wage than non-commuters. Therefore, the commuters might have a positive influence in the local market, as their expenditures are relatively higher in the local market. Also, because of this higher wage, the commuters are expressing their residential preferences to the rural area. However, this might result

in higher living costs for the people who are living in the rural areas (Bosworth and Venhorst, 2015).

2.5 Conceptual model

Figure 2 shows the conceptual model of this research. As becomes clear from the literature, rural and urban areas are interdependent and influence each other. The distance between the rural and urban areas might influence this interdependency. Also, commuters who are living in rural areas and are working in urban areas might play a big role in the relationship between the urban and rural areas. This is because commuters generally have a higher income compared to non-commuters, and therefore have higher expenditures in the rural economy.

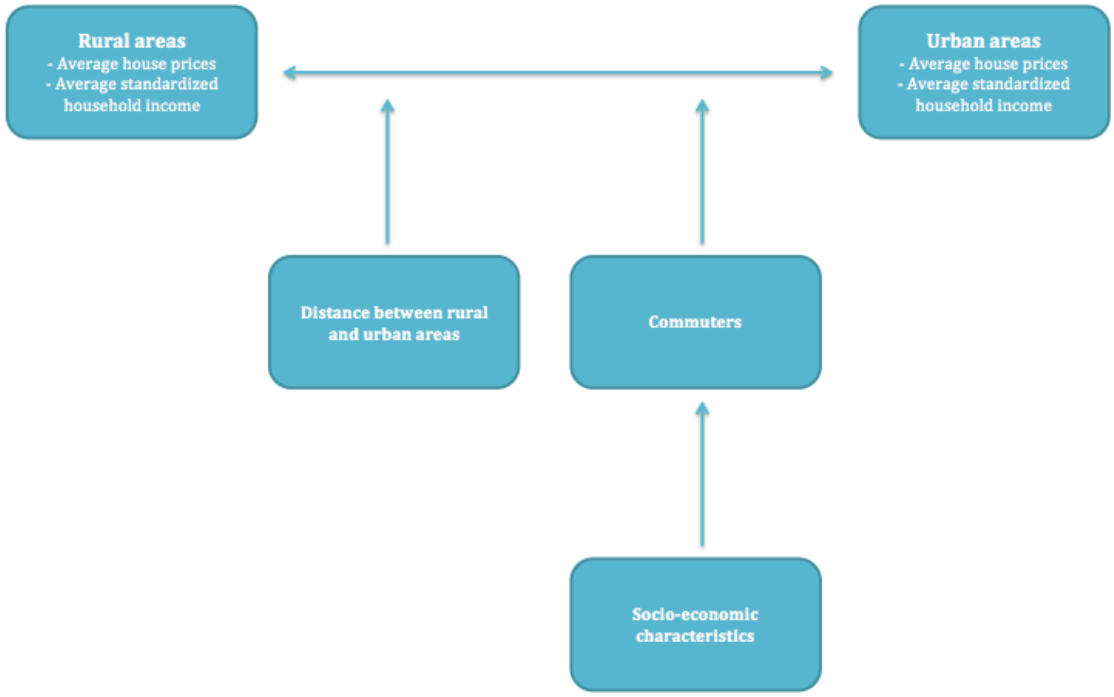

Figure 2: Conceptual model

This research will test what the relationship is between the share of commuters in rural areas and the development of rural areas in the North of the Netherlands. The development of rural areas is displayed by the average standardized household income and the average housing prices. Additionally, this research will look at the socio-economic characteristics of the commuters in the North of the Netherlands by means of a survey, to see whether the socio-economic characteristics of the commuters play a role in the relationship between the commuters and the development of rural areas. Subsequently, to test the influence of distance between the rural and urban areas, the kilometers travelled to work of the commuters in the survey will be used in the Pearson correlation. Herein, the relationship between the kilometers travelled to work, and the education level, income and the percentage of the times they do their grocery shopping in the municipality the respondents live in, will be looked at. Eventually, this research aims to answer the question what the relationship is between the share of commuters and the development of rural areas in Northern Netherlands.

Part III: Methodology

Firstly, one part of this research consists of primary data. A survey has been conducted to answer the second secondary question (see appendix I). Secondly, the other part of this research consists of secondary data to explore the relationship between the number of commuters and the housing prices, and the standardized household income. This data are collected on different scale levels of the Netherlands. Namely, this is done for the Netherlands as a whole, North of the Netherlands, and the rural and urban areas independently in both the Netherlands as a whole and the North of the Netherlands. In this part of the research, there will be descriptive comparisons/analyses between tables. The secondary data is used from the CBS, the statistics bureau of the Netherlands. The CBS gives independent, reliable information to answer different social issues in the Netherlands (CBS, 2019). The CBS provides the share of commuters, the standardized household income and the housing prices for each municipality of the Netherlands for the years 2014 until 2016.

3.1 Data collection

3.1.1 Survey

To research what the socio-economic characteristics of the commuters in the North of the Netherlands are, a survey has been conducted. As seen in the conceptual model, it is expected that the socio-economic characteristics of the commuters might play a role in the relationship between the share of commuters in rural areas and the development of rural areas in Northern Netherlands. Through the survey, this expectation is tested. From the literature it becomes clear that commuters generally are not higher educated, have a higher wage compared to non-commuters, and the housing prices in rural areas are lower compared to urban areas. The survey is a cross-sectional survey, which provides a view from a group at a particular time and is often descriptive (Mathers et al., 2007). For the collection of the data, the program Maptionnaire is used. Maptionnaire is an online questionnaire service and enables researchers to collect and analyze data (Maptionnaire, 2019).

One of the advantages of using a survey is that surveys are efficient. Relatively small sample sizes can be used to generalize conclusions to the wider population. Therefore, surveys are cost-effective (Mathers et al., 2007). The main disadvantages of using a survey is that surveys are dependent on the chosen sampling frame. If the sampling frame is not sufficiently comprehensive it could lead to results being hard to generalize to the wider population. Therefore, it is important to wisely choose a sufficient sampling frame.

The survey is initially sampled through social media platforms. The main reason for this way of sampling is to collect as many respondents from different municipalities as possible. The respondents received a link to the website of Maptionnaire and could fill in the survey from there. As will be further explained in Part IV, there are 15 different municipalities the respondents indicated to live in and 13 different municipalities the respondents indicated to work in. This indicates that the sampling method has succeeded in getting as many different respondents from different municipalities as possible. Additionally, the survey is sampled in two different companies: a high school in Assen and an engineering consultancy firm in Groningen. These respondents could fill in

the survey on paper and those results were imported to Maptionnaire afterwards. However, due to the sampling method in these two companies, the results of the survey could be biased. This might be the result of having more highly educated people and less dispersed sample. In total, a number of 55 useful respondents have been filled in and have been taken into consideration into this researched.

There were a number of requirements that the respondents had to comply to participate in the survey. These are as follows:

- The respondent have to live in the North of the Netherlands (Groningen, Friesland or Drenthe);
- The respondent have to live in a different municipality than they work in;
- The respondent have to live outside a city;
- And, the respondent could not be a student.

The reason for the requirement that a respondent could not be a student is to avoid complications caused by respondents who are still going to school (So et al., 2001). Students are not defined as commuters in this research, as their main occupation is being a student rather than being a worker.

The survey consists of seventeen questions in total. The variables age, gender, and the number of kilometers travelled to work are used to examine the representation of the survey. The other variables: education, income, housing prices and the mode of transport are used to conduct the analysis. The survey can be found in appendix I. The questions related to the education level and income has been chosen to verify what is stated in the literature. Namely, the literature states that commuters are in general not higher educated and/or have a higher income. To compare the results of the survey to the results of the data of the CBS, the disposable income of the respondents needs to be converted to the standardized household income. Therefore, in the survey the respondents are asked how many children they have, aged eighteen years or younger, and how many adults the household consist of. The calculation is explained below in 3.2.2. Furthermore, the question on the amount of kilometers travelled to work is applied to do the analysis with the Pearson correlation. Namely, this variable is the measure for the 'distance' variable between the work of the respondents and their homes. Additionally, the literature shows that commuters might have a positive influence on the local market, as they have a higher income and higher expenditures. To test this statement, the respondents are asked the percentage they do their grocery shopping in the municipality they live in. In this way, it will be tested whether they have a positive influence on the local supermarket. Supplementary, due to the higher incomes of the commuters, they might have a positive influence on the housing market. Therefore, the respondents are asked whether they think their property value of their house has increased, as well compared to their neighborhood. Additionally, the respondents are asked in what kind of house they live in, because this might play a role in the perception whether their property value of their house has increased. Lastly, the respondents are asked what mode of transportation they use to go to their work, as the literature shows that commuters mostly use the car as their mode of transportation.

3.1.2 Secondary

As it has become clear from the conceptual model, it is expected that the share of commuters have an effect on the development of rural areas in the North of the

Netherlands. To research this statement, secondary data of the CBS is used. By means of looking at the average house prices and the average standardized household income in rural areas in the North of the Netherlands, the development of rural areas will be tested. As mentioned before, CBS collected data of the three variables for each municipality in the Netherlands for multiple years. In this research the data on the years 2014, 2015 and 2016 are used. Due to way that CBS collects the data for each municipality, it provides the advantage of comparing different regions/areas with each other, but also to compare different years. Therefore, this manner of data collection by the CBS is advantageous for this research, in which different parts of the Netherlands will be compared.

On the contrary, there are also some disadvantages regarding the data of the CBS and using the three different years for comparisons. Firstly, the data is not complete for the standardized household income over the three years. Secondly, a number of municipalities have been merged together in the three years. Therefore, the total amount of municipalities differs over the three years and makes it not possible to compare those municipalities. The aforementioned disadvantage is, however, inevitable when comparing different municipalities. In addition, whilst not necessarily a disadvantage, the names of some municipalities have been modified in 2016. The municipality De Friese Meren is, for instance, modified to De Fryske Marren, and the municipality Goesbeek is modified to Berg en Dal.

3.2 Data analysis

To analyze the primary data gathered through the survey and the secondary data of the CBS, the statistical program SPSS is used. To analyze the secondary data, the Pearson correlation will be used. In the data of the CBS, the standardized household income is given for each municipality. In the survey, the standardized income is calculated based on the formula that will be explained below in 3.2.2.

3.2.1 Pearson correlation

On the basis of the Pearson correlation, the relationship between the standardized household income and housing prices, and the number of commuters in the years 2014 until 2016 is calculated. Additionally, the relationship between the kilometers travelled to work and the income, education level and the percentage that the respondents do their grocery shopping in the municipality they live in is calculated by means of a two-tailed Pearson correlation. Moreover, different scales are used to calculate the relationship between the standardized income and housing prices, and the number of commuters. Firstly, the relationship between the variables is calculated for the whole of the Netherlands. Afterwards, the relationship between the variables is calculated for all the rural and urban areas independently in the Netherlands. These results will be compared to the results of the relationship between the variables in the North of the Netherlands and the rural and urban areas independently in the North of the Netherlands. In order to state the strengths of the correlations, the categorization of Cohen (1988) will be applied. These categorization is as follows: weak is when $R < 0,3$, medium level is when $0,3 \leq R < 0,5$ and strong when $R \geq 0,5$.

3.2.2 Standardized household income

Regarding income, the amount of people the household consists of matters. Therefore, to make comparisons between different sizes of households possible, the household income is standardized. This standardized income is also called purchasing power (CBS,

2018). To transform the household income to the standardized household income, the household income is divided by a factor that expresses how large the economies of scale are at a joint household. This factor is also called the equivalence factor. Hereby, a single person household has been chosen as the standard of reference and is the equivalence factor equal to one. For every additional adult, a number between 0,19-0,37 will be added to the equivalence factor. For every additional minor, a number between 0,15-0,33 will be added to the equivalence factor (CBS, 2018). Table 1 shows the equivalence factors for households with varying amounts of adults and minors. A minor is defined here as a child that is younger than eighteen years old (CBS, 2018).

Number of adults ↓	**Number of minor children →**				
	0	**1**	**2**	**3**	**4**
1	1,00	1,33	1,51	1,76	1,95
2	1,37	1,67	1,88	2,06	2,28
3	1,73	1,95	2,14	2,32	2,49
4	2,00	2,19	2,37	2,53	2,68

Table 1: Equivalence factors
Source: CBS (2018)

3.3 Definition of rural and urban municipalities

To research the relationship between the number of commuters and the average house prices and the average standardized household income in rural and urban areas in the Netherlands, the definition of Dulk et al. (1992) will be used to define the two areas. The definition of Dulk et al. (1992) is called 'omgevingsadressendichtheid' or 'environmental address density' in English. This 'environmental address density' is expressed by the number of addresses per square kilometer. It is intended to reflect the degree of concentration of human activities, like living, working and going to school. This definition is used especially to indicate the degree of urbanization in areas. Using classification of Dulk et al. (1992), areas with 500 or fewer addresses per square kilometer are classified as non-urban. In this research, this classification will be used to indicate rural areas. When an area has more than 500 addresses per square kilometer, this area is classified as an urban area.

3.4 Ethics

Nowadays, it becomes more and more important to consider ethical issues in researches (Love, 2012). In this research, a number of measures will be taken into consideration to ensure a good ethical procedure. Firstly, within the survey all respondents will be informed about the research and its goal. Secondly, the respondents fill in the survey anonymously and their privacy will be guaranteed. Besides, the data gathered in this research will not be used for any other purpose than this research. The respondents have the right to stop the survey at any time they want, and are not obligated to answer the questions if they do not want to. Lastly, the introduction of the survey contains an email address for the purpose of asking questions and/or wishing to receive the research when finished.

Part IV: Results

4.1 The socio-economic characteristics of the commuters

To research the socio-economic characteristics of the commuters in the North of the Netherlands a survey has been conducted (see appendix I). The variables age, gender and the number of kilometers travelled to work are used to examine the representatively of the survey. The other variables: education, income, mode of transport, house prices and where they do their grocery shopping are used to do the analysis. In total there are 55 respondents of which 53% is female and 47% is male. This is a relatively equal distribution. The respondents state to live in a total of fifteen different municipalities. The two most mentioned municipalities are Aa en Hunze and Tynaarlo (see table 2). The respondents mentioned fewer different municipalities where they work, namely thirteen different ones (see table 3). The striking municipalities here are Assen and Groningen. This is in line with CBS (2013), which states that commuters mostly commute to cities. The municipality of Groningen consists of the city Groningen, which is the largest city in the North of the Netherlands. Additionally, the municipality of Assen consists of the city Assen, which is the third largest city of Northern Netherlands. According to Hughes and Holland (1994), an explanation for the finding that most commuters commute to the city could be that cities are the main suppliers of higher-order services. This means that cities offer more jobs, and offer jobs that are not typically available in rural areas.

Municipality	Frequency	Percentage
Aa en Hunze	16	29,1
Assen	1	1,8
Borger Odoorn	1	1,8
Coevorden	1	1,8
De Fryske Marren	1	1,8
De Wolden	1	1,8
Groningen	2	3,6
Heerenveen	1	1,8
Midden-Drenthe	9	16,4
Midden-Groningen	1	1,8
Noordenveld	2	3,6
Old Ambt	1	1,8
Ooststellingwerf	3	5,5
Opsterland	1	1,8
Tynaarlo	14	25,5
Total	**55**	**100**

Table 2: Different municipalities where the respondents live

Municipality	Frequency	Percentage
Aa en Hunze	2	3,6
Assen	17	30,9
Groningen	26	47,3
Heerenveen	1	1,8
Hoogeveen	1	1,8
Kampen	1	1,8
Leeuwarden	1	1,8
Midden-Groningen	1	1,8
Opsterland	1	1,8
Roden	1	1,8
Sud West Fryslan	1	1,8
Tynaarlo	1	1,8
Veendam	1	1,8
Total	**55**	**100**

Table 3: Different municipalities where the respondents work

To check whether the survey is representative to the commuters of the Netherlands, this research focuses on the following variables: number of kilometers travelled to work, gender and age. The results show that the average kilometers travelled by the respondent to get to their work is between twenty and 25 kilometers. As CBS (2018) shows, the average kilometers travelled by commuters are 22.5. Additionally, the results of the survey show that the respondents travel on average fifty minutes to their work and back. Moreover, the average age of the respondents is 46 years old, the youngest respondent is 21 years old and the oldest is 72 years old. As Veneri and Rulz (2016) state, the younger people are moving from rural to urban areas. This might mean that in general the commuters from rural to urban areas are mostly older people. Lastly, the variable gender will be examined. As mentioned before, out of the 55 respondents are 53% are female and 47% are male. However, as CBS (2016) states, males commute more often compared to females. Subsequently, males drive more kilometers to their work. According to the CBS (2016) is, that males are working full-time more often and females part-time.

The survey seems to be representative, as it shows that two out of the three variables are in line with the literature. However, 55 persons have responded to the survey, which makes the survey not representative to the whole population of commuters of the Netherlands. Therefore, it is not possible to draw conclusions for the whole population, but this does not alter the fact that it is possible to draw conclusions for the sample of respondents.

Aside from the variables that check whether the survey is representative, there is a number of variables to conduct the analysis. The results of the survey show that the car is the most used mode of transport to work. This is also visible in figure 3. Approximately 74% of the respondents use the car as a mode of transport. In the survey it was possible to choose multiple answers to this question. For example, it is possible that someone goes by bike to the bus stop and goes farther by bus to their work. According to Bosworth and Venhorst (2015), in the last two decades the ownership of cars has significantly increased. In order to enhance the mobility of the individuals living in rural areas, investments should be made in the infrastructure between urban and rural areas. As most of the respondents indicated that they work in the city and use the car for transportation, it is important to invest in the infrastructure between those cities

and the rural areas. The respondents indicated generally not to make use of carpooling. Namely, only four out of the 55 respondents responded 'yes' to this question.

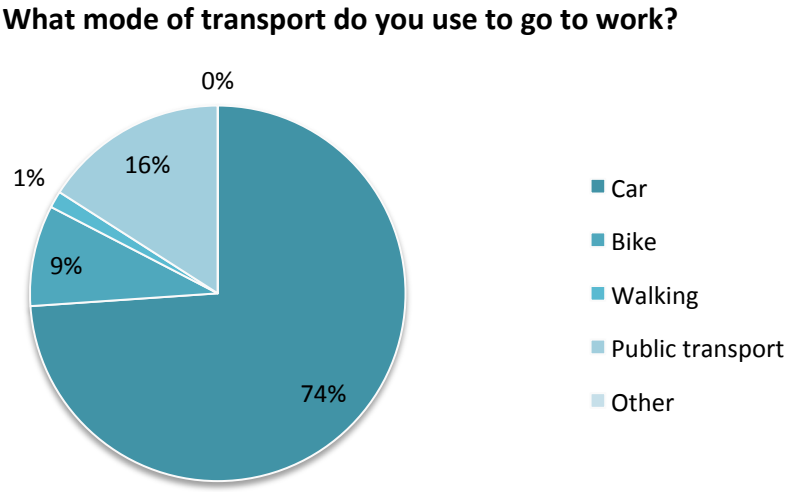

Figure 3: Mode of transport used to go to work

There is not really a pattern visible in the professions that respondents practice. The only professions that have more than one respondent practicing it are teachers and managers. From the 55 respondents, twelve indicated to be a teacher and six indicated to be a manager.

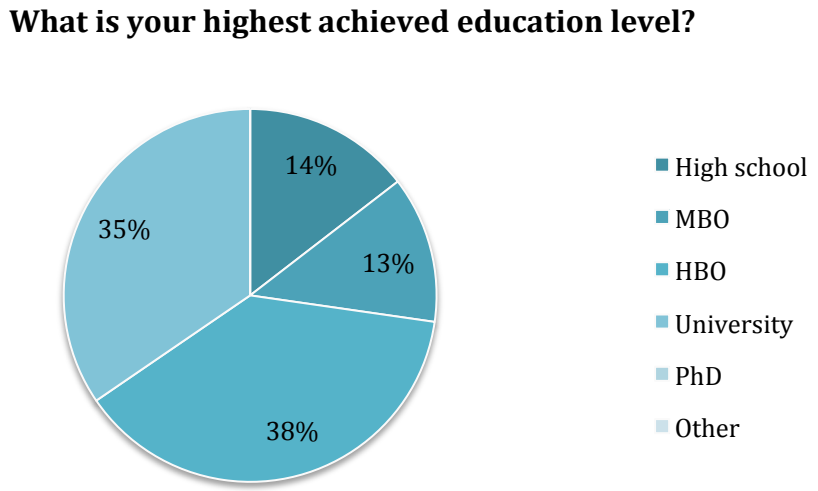

Figure 4: The highest achieved education level of the respondents

As can be seen in figure 4, most of the respondents have a HBO (higher education) or a university degree. There are no respondents that finished a PhD. On average, the respondents are higher educated. In the literature it is not clear whether the higher educated people are more likely to commute or not. On the one hand, So et al. (2001) state that higher educated people are less likely to commute and more likely to live in urban areas, although the effect is not precisely estimated. On the other hand, Veneri et al. (2012) state that higher educated commuters are more likely to work in urban areas

with high economic density and productivity. A reason for this might be that the wages in urban areas are higher (Veneri at al., 2012). Considering the imprecise effect by So et al. (2001), the statement of Veneri et al. (2012) is assumed to be more correct. The results of the survey are thus in line with the research of Veneri et al. (2012), as higher educated people are more likely to commute to urban areas.

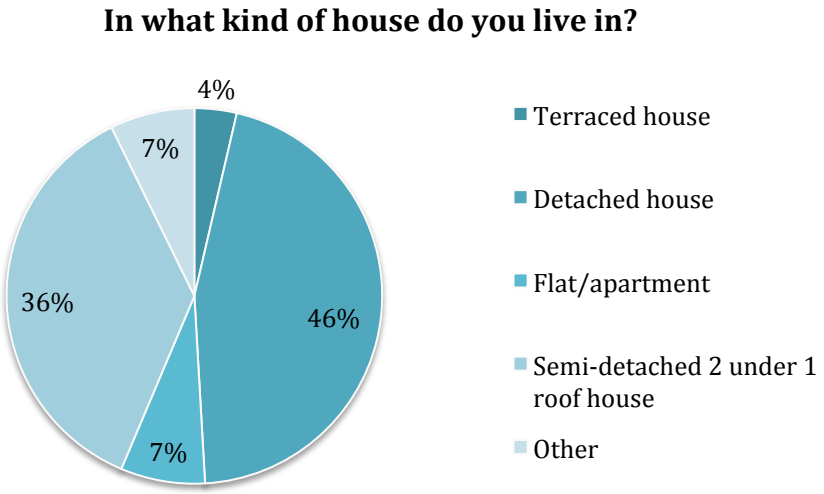

Figure 5: Kind of houses respondents live in

Many of the respondents indicated that they live in a detached house or in a semi-detached 2 under 1-roof house (see figure 5). Out of the 55 respondents, 25 respondents live in a detached house and twenty respondents live in a semi-detached 2 under 1-roof house.

The average disposable income of the respondents is €48.638. The minimum disposable income is €9600 and the maximum disposable income is €110.000. However, there are three respondents who did not fill in this question. Furthermore, the results show that the households have on average 0,56 minors and consist on average out of 2,07 adults. As mentioned before, with the disposable income and the number of minors and adults in the household, the standardized household income can be calculated (CBS, 2018). This is done for every municipality where the respondents indicated to live. The results are visible in table 4.

The results of the survey are compared with the data of the CBS on the standardized household income in the municipality where the people are residents. As is visible, some of the results of the survey are not in line with the data of the CBS. However, the results of the CBS are from the year 2016, so it might have changed. Subsequently, there are not many respondents of every municipality, which could result in biased results. Moreover, the CBS did not have data on the standardized income of the municipality of Midden-Groningen, which makes comparisons impossible.

Municipality	Number of respondents	Survey results	CBS results (2016)
Aa en Hunze	15	€32.749,27	€27.000
Assen	1	€62.043	€24.600
Borger Odoorn	1	€10.638	€25.100
Coevorden	1	€26.595	€24.800
De Fryske Marren	1	€43.795	€25.300
De Wolden	1	€37.234	€27.100
Groningen	2	€19.100,50	€18.900
Heerenveen	1	€27.000	€24.500
Midden-Drenthe	9	€39.537,22	€26.100
Midden-Groningen	1	€36.496	-
Noordenveld	1	€29.126	€26.400
Oldambt	1	€32.000	€22.400
Ooststellingwerf	3	€44.598,33	€24.200
Opsterland	1	€47.445	€25.200
Tynaarlo	13	€29.880,85	€28.600

Table 4: Average standardized income of survey and CBS (2016) per municipality.

Furthermore, most respondents indicated that they think the property value of their house did increase in the last ten years. Out of the 55 respondents, 46 respondents answered that they think the property value of their house did increase. However, the respondents indicated that they did not think the property value of their house increased compared to the rest of the neighborhood. Merely nine out of the 55 respondents replied that they did think it increased compared to the neighborhood. A reason for this finding could be that the property value of the houses has increased due to the booming housing market.

Moreover, on average the respondents indicated that they do 74,65% of their grocery shopping in the municipality that they live in. On the one hand, there are respondents who indicated that they do 0% of their grocery shopping in the municipality that they live in. On the other hand, there are also respondents that indicated to do 100% of their grocery shopping in their municipality. According to Ottaviano (2008), commuters might have a positive role in the local market. They expend their generated income in the local market. Commuters have on average a higher wage compared to non-commuters and might have higher expenditures in the local market (So et al., 2001). As the literature indicates, the respondents that do their grocery shopping in the municipality that they live in might have a positive role in the local market. All in all, the respondents have higher wages and expenditures.

The variation in the percentage of the times the respondents do their grocery shopping in the municipality they live in is interesting. There are some possible reasons for this variation. As one respondent mentioned for instance, there is no supermarket in the same municipality nearby their home. Therefore, they do their grocery shopping in another municipality than they live or work in. In this case it is hard to compare the results of the survey with the research of Ottaviano (2008). As Ottaviano (2008) state, the commuters might have a positive role in the local market. It is therefore recommended for future research to focus on the location of the grocery shopping of the commuters. To this end, it is possible to research the role of the commuters on the development of rural areas. Additionally, it is recommended hereby to focus on the

areas nearby the commuters' homes instead of focusing on the municipalities they do their grocery shopping in. In this way, the aforementioned problem will be prevented.

4.1.1 Distance

As mentioned before, distance might play an important role in the development of rural areas (Veneri and Rulz, 2016). When rural areas are located close to urban areas, they mostly experience spread effects, while rural areas located further away are mostly experiencing backwash effects. In addition, according to Patridge et al. (2008), distance is the key factor in employment and population growth in rural areas. To test those statements, the relationship between the distance from the respondents' home to work, their education level, disposable income and the percentage of the percentage that the respondents do their grocery shopping in the municipality they live in, has been investigated. With these data, a Pearson correlation has been conducted to research the relationship between the kilometers travelled to work and the other variables. For instance, as So et al. (2001) state, longer commuting distance requires higher wages due to the commuting costs and to leave the worker better off instead of working in the place they live in. This makes it reasonable to assume that the commuters that travel more kilometers to work are earning a higher wage. According to So et al. (2001), due to the higher income, the commuters might have a positive influence in the local market, as their expenditures are relatively higher in the local market compared to non-commuters. Next to that, from the survey has become clear that the respondents are on average higher educated. Therefore, in the next section the effect of the distance on the different variables has been examined.

		Disposable income	**Level of education**	**Percentage grocery shopping**
Kilometers travelled to work	Pearson - Correlation Sig. (2-tailed) N	.236 .092 52	.384** .004 55	.117 .394 55

Table 5: SPSS outcomes of the Pearson correlation between the kilometers travelled to work and the disposable income, level of education and percentage grocery shopping.

The results of the Pearson correlation are visible in table 5. As is shown, the correlation between the kilometers travelled to work and the disposable income is not significant at the 0.05 level. Subsequently, the correlation between the kilometers travelled to work and the percentage that the respondents do their grocery shopping in the municipality they live in, is not significant as well. The reason that there is no correlation between the variables may be the result of the small sample size. In addition, another reason might be that, as one respondent mentioned, there is no supermarket nearby in the municipality the respondent lives in. Therefore, it may depend on the location where the respondents live, whether there is a correlation or not. The correlation between the kilometers travelled and the level of education is significant at the 0.01 level (2-tailed). There is a positive medium level correlation, which means that when the kilometers travelled to work increase, the level of education of the respondents will increase as well. This is in line with the research of Veneri et al. (2012), as they state that higher educated people are more likely to work in urban areas due to the high economic density and productivity. Additionally, urban areas offer jobs that are not available in

rural areas. Therefore, higher educated people travel more kilometers to their work compared to lower educated people (CBS, 2016).

4.2 The relationship between the number of commuters and the housing prices and the standardized household income

It is important to delineate the general image of the Netherlands by means of some basic statistics prior to the Pearson correlation test. So et al. (2001) state that the commuters have a higher wage compared to non-commuters, and Bosworth and Venhorst (2015) state that the living costs might increase due to the commuters. Subsequently, CBS (2013) states that commuters mostly commute from rural areas to the big cities/urban areas. However, is this true for the Netherlands as well? Data of the CBS are used about the absolute numbers of commuters living in certain municipalities to illustrate the general image of the Netherlands. These basic statistics are based on the five municipalities with the highest number of outflow, and on the five municipalities with the lowest number of outflow. The results of the tables are visible in Appendix II. Firstly the statement of the CBS (2013) is examined. This leads to wonder whether the commuters in the Netherlands commute from rural to urban areas. As is visible in tables 7 and 8, the municipalities with the highest number of outflow are urban municipalities. The concept of outflow means that people are living in the mentioned municipality and are commuting to another municipality. Additionally, the municipalities with the lowest numbers of outflow are mostly rural municipalities; exceptions are the municipalities Eemnes and Hattem.

Secondly, So et al. (2001) and Bosworth and Venhorst (2013) state that commuters have a higher wage compared to non-commuters and that the living costs might increase due to the commuters. Tables 7 to 11 show the highest and lowest number of outflow, the average income and the average house prices for the (rural) municipalities in the Netherlands and for the (urban and rural) municipalities in the North of the Netherlands. As table 7 shows, the municipalities with the lowest number of outflow have on average a higher income and house price compared to the municipalities with the highest number of outflow. Table 8 shows that the municipalities with the lowest number of outflow have on average a higher income, but the municipalities with the highest number of outflow have on average a higher house price. When looking at the rural municipalities in both the Netherlands and in the North of the Netherlands (tables 10 and 11), it is visible that the municipalities with the highest number of outflow both have on average a higher income and a higher house price.

Moreover, So et al. (2001) also state that commuters are attracted to areas with higher wages. When looking at the municipalities Groningen and Amsterdam that have the highest number of outflow in rural Northern Netherlands and the Netherlands respectively it shows that the commuters do not necessarily commute to municipalities with higher wages. The municipalities where the commuters mostly commute to, do not have the highest wages compared to the other municipalities.

However, the basic statistics are based on the absolute numbers of commuters in the municipality instead of the share of the commuters in the municipality. Municipalities with a lot of inhabitants (almost always) subsequently have higher numbers of outflows compared to municipalities with fewer inhabitants. Furthermore, the basic statistics are based on the five municipalities with the highest and the lowest numbers of outflow

with the intention to give an illustration. This might result in conflicting results when comparing the basic statistics to the literature, but also when comparing it to the results of the Pearson correlations researched in section 4.2.1. A reason might be that the other municipalities show a different image compared to the five highest and lowest numbers of outflow. The intention to show the basic statistics of the Netherlands is to show the general image of the commuters in the Netherlands rather than drawing conclusions on whether or not the Dutch commuters verify with the literature.

Moreover, to statistically test whether there is a positive or a negative correlation between the commuters and the standardized household income and the house prices, a Pearson correlation test is executed. This relationship is tested on different scales, namely for all the municipalities in the Netherlands and in the North of the Netherlands and on the scale of the rural and urban municipalities independently in the Netherlands and in the North of the Netherlands. Northern Netherlands consists out of three provinces, namely Groningen, Drenthe and Friesland. This correlation is done over the three years: 2014, 2015 and 2016. The municipalities of the Wadden Islands are excluded in this research. A reason for this exclusion is, as visible in figure 6, that the municipalities of the Wadden Islands are outliers that have a major influence on the results. The Wadden Islands are the five dots depicted on the left side in figure 6. Those municipalities have (almost) zero commuters and have a relatively high standardized household income and high house prices. Therefore, the municipalities of the Wadden Islands are excluded from this research. Those municipalities are: Texel, Vlieland, Terschelling, Ameland and Schiermonnikoog. This is the case for the three different years and the different scales.

As mentioned before, the rural municipalities are defined in this research as municipalities with 500 or fewer addresses per square kilometer (Dulk et al., 1992). Besides, the average standardized household income variable is divided by a factor thousand and the number of commuters is presented in percentages as the share of commuters of the total population of the municipality. For the extensive explanation, correlations, scatterplots and conclusions of the correlations, see Appendix III.

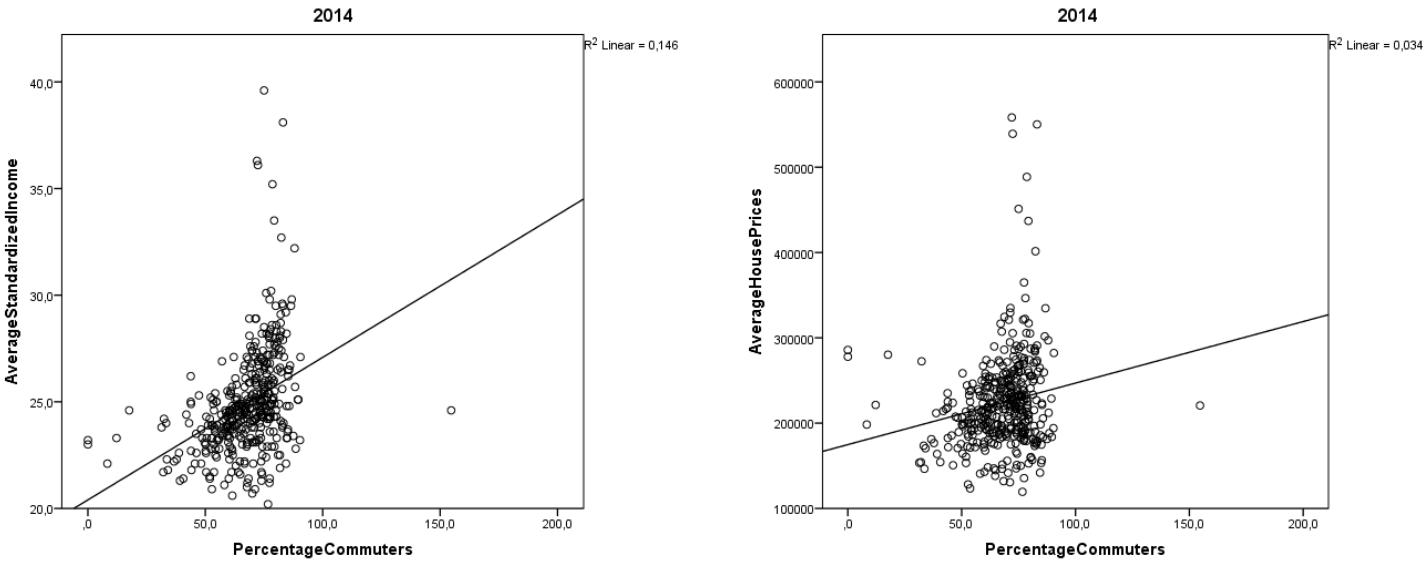

Figure 6: Scatterplots of percentage commuters and the average standardized household prices, and the average house prices in all the municipalities of the Netherlands in 2014, including the Wadden Islands.

4.2.1 Pearson correlations

The results of the Pearson correlations are summarized in table 6. As is visible, for all the municipalities in the Netherlands the correlation between the percentage commuters and the standardized household income is significant at the 0.01 level. This means that when the percentage commuters increases, the standardized household income would increase as well. When looking at the correlation between the house prices and the percentage commuters, it becomes clear that there is also a positive correlation between the two variables. In figure 7, the scatterplots of the year 2016 are shown. As is visible, a distinction is made herein between the urban and rural municipalities: blue circles are urban municipalities and the green circles are rural municipalities. Two clusters are visible in the figure; the urban municipalities are mostly clustered at the left side of the scatterplot, and the rural municipalities are mostly clustered at the right side of the scatterplot. The finding that the rural municipalities are clustered at the right of the scatterplot is in line with the CBS (2013), where they state that mostly people from rural areas commute to urban areas. Therefore, rural areas have a higher percentage of commuters compared to urban areas. The regression lines within the scatterplots all indicate a positive correlation between the percentage commuters and the average house prices and the average standardized household income. However, due to the clusters it might be that the correlations are different compared to when focusing on the two clusters separately. Therefore, this research will focus on the two clusters independently in the next chapter to see if the correlation will change.

		Nether-lands	Rural NL	Urban NL	North of NL	Rural of North of NL	Urban of North of NL
2014 Income	Pearson -Correlation	.422**	.205*	.487**	.387*	.329	.374
	Sig. (2-tailed)	.000	.045	.000	.004	.070	.072
	N	398	96	302	55	31	24
House prices	Pearson -Correlation	.260**	.009	.336**	.193	.060	.257
	Sig. (2-tailed)	.000	.934	.000	.159	.750	.226
	N	398	96	302	55	31	24
2015 Income	Pearson -Correlation	.208**	.024	.245**	.205	-.212	.243
	Sig. (2-tailed)	.000	.832	.000	.140	.279	.242
	N	382	81	301	53	28	25
House prices	Pearson -Correlation	.102*	-.128	.161**	-.051	-.266	.058
	Sig. (2-tailed)	.047	.254	.005	.715	.172	.779
	N	383	81	302	54	28	26
2016 Income	Pearson -Correlation	.497**	.129	.542**	.427**	-.117	.543**
	Sig. (2-tailed)	.000	.287	.000	.003	.594	.009
	N	371	70	301	45	23	22
House prices	Pearson -Correlation	.251**	.098	.298**	.260	.206	.249
	Sig. (2-tailed)	.000	.391	.000	.055	.266	.241
	N	385	79	306	55	31	24

Table 6: SPSS outcomes of the Pearson correlation between the percentage commuters, standardized income and house prices for the different scales and different years.
**. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).*

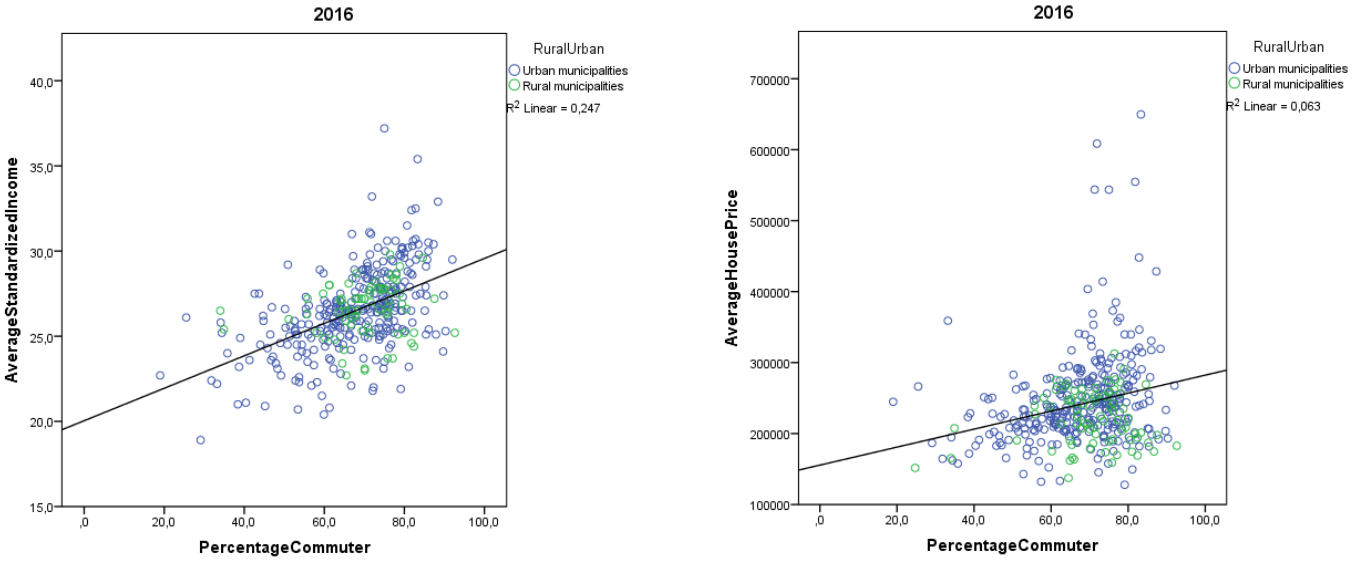

Figure 7: Scatterplots of percentage commuters and standardized household income and average house prices for all the municipalities in the Netherlands in 2016.

4.2.2 North of the Netherlands

When looking at all the municipalities in the North of the Netherlands, it becomes clear that the correlation between the percentage commuters and the standardized household income is significant (except for the year 2015). An explanation for this finding could be found in the research of So et al. (2001), where they state that commuters are attracted to areas with higher wages. Urban areas have higher wages compared to rural areas; therefore commuters have a higher wage than non-commuters. These results of the research of So et al. (2001) strengthen the results of the Pearson correlation in this research. Namely, when the percentage of commuters is increasing, the average standardized household income will increase as well. However, the correlations between the percentage commuters and the average house prices are not significant. This means that there is no correlation between the two variables. This is in contradiction with the research of Bosworth and Venhorst (2015), where they state that due to the higher wage of commuters, the costs of living could rise as well in the rural areas. The research of Bosworth and Venhorst is, however, focused on the United Kingdom. This could result in differences in the findings, as this research is focused on the Netherlands.

4.2.3 Rural municipalities

When looking at the correlations for the rural municipalities in the Netherlands and in Northern Netherlands, it becomes clear that (almost) no correlation is significant. This means that there is no correlation between the percentage commuters and the average standardized household income and the house prices. Only the correlation between the percentage commuters and the average standardized household income in rural municipalities in the Netherlands in 2014 is significant. This finding is in contradiction with the research of So et al. (2001), where they state that commuters have a higher wage compared to non-commuters. However, the results of the Pearson correlations show that commuters do not necessarily have a higher wage. This means that when a rural area has a lot of commuters, it does not necessarily mean that the average wages in the rural areas are also higher. This also applies to the average house prices in the rural

areas. Therefore, the results of this research are also in contradiction with the research of Bosworth and Venhorst (2015), where they state that commuters might cause higher living costs for the people who are already living in the rural areas.

An explanation for the findings of the Pearson correlations could be the distance between the rural areas and the urban areas. According to Barkley et al. (1996), when rural areas are close to urban areas, they experience spread effects, while rural areas farther away from the urban areas are experiencing backwash effects. In the North of the Netherlands and in the Netherlands in general, there are relatively few big cities. The research of Barkley et al. (1996) is focused on cities in the United States. Compared to the United States, the Netherlands has relatively small-scale cities. Therefore, the results of the Pearson correlations of the (North of the) Netherlands could not be compared to the results of the study in the United States. Even if there are findings in the United States, this does not have to be the case in the Netherlands. This could be the explanation why rural areas in (the North of) the Netherlands are not experiencing the spread effects of the urban areas.

When looking at the scatterplots of the correlations (see Appendix II for all the scatterplots), the first thing that strikes out is that not every correlation is positive anymore compared to the scatterplots of all the municipalities in the Netherlands (see figure 8). In the correlation between the percentage commuters and the average house prices in the rural municipalities in the Netherlands in 2015, the correlation has a negative slope. This supports the argumentation aforementioned, that it is important to focus on the two clusters independently, as they might show different results. However, as shown and mentioned before, the correlations between the percentage commuters and the average house prices and the average standardized household income in the rural municipalities in the Netherlands, are not significant.

4.2.4 Urban municipalities

When looking at the urban municipalities in the Netherlands, it becomes clear that the correlations are all significant at the 0.01 level. This means that when the percentage commuters increase in the urban municipality, the standardized household income and the house prices will increase as well. An explanation for this finding could be found in the research of So et al. (2001), where they state that the wages in urban areas are higher than wages in rural areas. As mentioned in the literature, most of the commuters commute to urban areas as those areas offer jobs that are not available in rural areas. Therefore, the commuters in urban areas are expected to commute to other urban areas. As So et al. (2001) state, the wages are higher in urban areas, which is in line with the positive results of the Pearson correlation. In turn, this has a positive effect on the housing prices in those urban areas. The commuters have higher expenditures in the local market, and therefore the costs of living might rise in those areas. This is in line with the research of Bosworth and Venhorst (2015). However, when looking at the urban municipalities in the North of the Netherlands, it is visible that there is no correlation between the variables. Only the correlation between the percentage commuters and the standardized household income in 2016 is significant. An explanation could be that the cities in Northern Netherlands are relatively small compared to the rest of the Netherlands. Therefore, the wages might be lower in smaller urban areas as is the case the North of the Netherlands. This could be an explanation why there is no correlation between the share of the commuters and the urban areas in

Northern Netherlands and in contrast that there is a correlation in urban areas in the Netherlands.

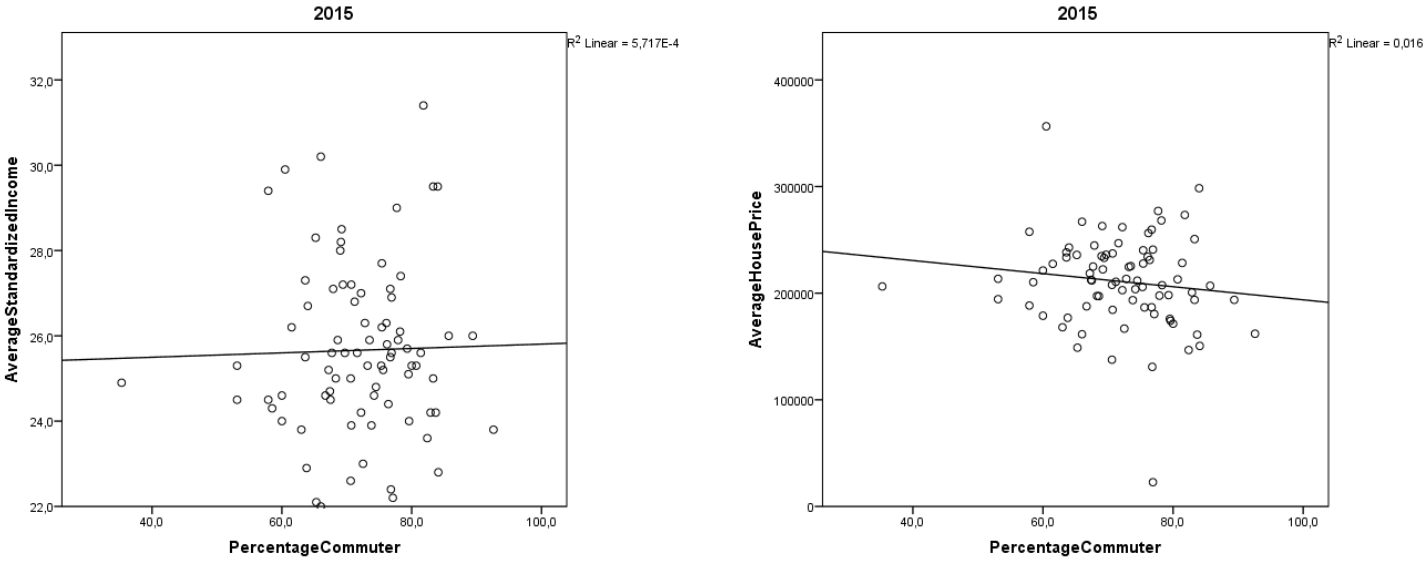

Figure 8: Scatterplots of percentage commuters and standardized household income and average house prices for rural municipalities in the Netherlands in 2015

Part V: Conclusions

The purpose of this research was to determine what the relationship is between the share of commuters in rural areas and the development of rural areas in the North of the Netherlands. This relationship was researched by means of looking at the relationship between commuters and the average standardized household income and the average house prices in rural areas in the North of the Netherlands. The literature shows that the number of commuters in the Netherlands has been increasing over the past few years. Especially urban areas attract commuters that live in rural areas. Rural and urban areas are interdependent because of those commuting flows, but also because of population migration and firms and households that move out of urban areas to rural areas due to urban congestion and high costs. Urban areas can have either a positive or a negative effect on rural areas, which is also called the spread and backwash effects. Spread effects happen in most cases when rural population- and employment growth originates from urban growth. It is expected that spread effects only affect rural areas that are close to urban areas. On the other hand, due to the growing economic activity in urban areas, rural population and employment may decline. The reason might be that households in rural areas may be attracted to migrate to the growing urban areas to seek employment opportunities and access urban services and amenities. The net effects of the spread and backwash effect will determine whether the urban area positively or negatively affect the rural area.

The socio-economic characteristics of the commuters might play a role in the relationship between the share of commuters and the development of rural areas. To research those socio-economic characteristics of the commuters in the North of the Netherlands, a survey has been conducted. However, there were only 55 respondents, which is a relatively small sample size. This means, even after the representative test, that no conclusions can be drawn for the whole population. However, this does not alter the fact that conclusions may be drawn for the respondents.

The results of the survey show that the average kilometers travelled by the respondents is 22,5 and that the car is the most used mode of transport to work. Most of the respondents do not make use of carpooling. On average, most of the respondents have a HBO or a university degree. This finding shows that the average respondent is higher educated. Next to that, the average disposable income of the respondents is €48.638. The results also show that on average the respondents do 74,65% of their grocery shopping in the municipality where they live. The percentages show a lot of variation, which might be the result of not having a supermarket close by in the municipality the respondents live in. However, as the literature indicates, the respondents who do their grocery shopping in the municipality they live in might have a positive role in the local market due to the higher wage and higher expenditures. It is therefore recommended to expand the research on the location of grocery shopping by commuters. Furthermore, the respondents indicated that they do think the property value of their houses increased in the last ten years, but that they do not think that it increased compared to the rest of the neighborhood. The average age of the respondents is 46 years old.

From the literature it becomes clear that the distance might play an important role in the interdependency of rural and urban areas. Therefore, a Pearson correlation has been executed to research what the relationship is between the kilometers travelled to work

and their income and education level. The results of the Pearson correlation show that there is no correlation between the kilometers travelled to work and the disposable income of the respondents. In addition, the correlation between the kilometers travelled to work and the percentage the respondents do their grocery shopping in the municipality they live in, is not significant. However, there is a positive correlation between the kilometers travelled to work and the level of education. This means that when the kilometers travelled to work increase, the level of education will increase as well. The higher educated commuters in the survey travel on average more kilometers to their work compared to the lower educated respondents. An explanation for this finding might be that urban areas offer jobs that are not available in rural areas; therefore the higher educated people have to travel longer distances to find a suitable job.

As a result of applying some basic statistics, it becomes clear that the Dutch commuters do not match with the statements in the literature. There might be several reasons why the literature and the basic statistics do not match. Firstly, the basic statistics are based on the absolute numbers of commuters in the municipality instead of the share of the commuters in the municipality. Secondly, the other municipalities might show a different image compared to the image of the municipalities with the five highest and lowest numbers of outflows. The intention to show the basic statistics of the Netherlands was to show the general image of the commuters in the Netherlands rather than drawing conclusions on whether or not the Dutch commuters verify with the literature.

Moreover, to statistically test whether there is a positive or a negative correlation between the commuters and the standardized household income and the house prices (in rural areas and urban areas) in the (North of the) Netherlands, a Pearson correlation test has been executed on the basis of data of the CBS. From the results of all the Pearson correlations it becomes clear that it does matter to look at different scales to do these correlations. Firstly, there is a positive correlation between the percentage commuters and the average standardized household incomes and the average house prices on the scale of the Netherlands and on the scale of the urban municipalities in the Netherlands. When looking at the rural municipalities in the Netherlands, it shows that there is no correlation between the three variables. This is also the case for the rural and urban municipalities separately in the North of the Netherlands. When looking at all the municipalities in the North of the Netherlands, there is a positive medium level correlation between the percentage commuters and the average standardized household income. In short, the results of the Pearson correlations do not match with the basic statistics about the Dutch commuters. It is therefore recommended to further research about the relationship between the share of commuters and the development of rural areas.

To conclude, the main question of this research was: 'What is the relationship between the share of commuters in rural areas and the development of rural areas in the North of the Netherlands?' As the results show, commuters do not have an effect on the housing prices and standardized household income in rural areas in the North of the Netherlands. The correlations were not significant, which means that no definite conclusions may be drawn on the relationship between the share of commuters and the

development in rural areas in the North of the Netherlands. Only when looking at larger and different scales, a positive correlation between the variables appears.

5.1 Discussion

In this research, a survey has been conducted to research what the socio-economic characteristics of the commuters are. However, there were only 55 respondents, which makes the results debatable. Out of some municipalities, there is only one respondent or none at all. Therefore, the results of the survey might be biased despite the representative test. This makes it hard to draw conclusions for the whole population. However, it is possible to draw conclusions for the higher educated respondents in the North of the Netherlands.

Next to that, the data of the CBS is used to research the relationship between the number of commuters and the average standardized household incomes and the average house prices. Not for every municipality, data was available for the three variables. This might have influenced the results of the Pearson correlation.

Moreover, not all the questions of the survey were as relevant as expected. Firstly, the question whether the respondents used carpooling, is not relevant in this research. It was important to know their mode of transport to work, but not whether they use carpooling. Secondly, the question in which kind of house the respondents live in was not relevant as well. This question was intended to research what the role of the kind of house might play on whether the respondents think their property value of their house has increased. However, nine out of the 55 respondents indicated that they did not think their property value of their house has increased compared to the rest of the neighborhood. Therefore, the variable was not relevant.

However, some questions of the survey were relevant, but did not work out well. This is especially the case for the question on the percentage the respondents do their grocery shopping in the municipality they live in. As is shown in the results, there is a lot of variation in the answers. This might indicate that the question is not correctly formulated. Multiple respondents mentioned that they do not have a supermarket nearby in the municipality they live in and therefore do their grocery shopping in a different municipality than they live or work in. Therefore, it was not possible to research whether the respondents had a positive influence on the local supermarket. In the future, the question should be formulated better in such a way that the respondents are asked whether they do their grocery shopping in the local area they live or work in, rather than asking about the municipality. Furthermore, another question that did not work out well is the question about the kind of profession the respondents practice. Due to the small sample size, there was not a clear pattern visible in the professions that respondents practice. Only the professions of teacher and manager have been mentioned more than once, which is likely the result of the sampling method in the two companies. Therefore, it was not possible to state anything about the professions of the respondents and whether this socio-economic characteristic plays a role in the relationship between the share of commuters and the development of rural areas.

Additionally, to research the distance between the rural and urban areas the kilometers travelled to work by the commuters is used as the distance variable. The main reason for the use of the kilometers travelled to work is the statement in the literature that

commuters travel from rural to urban areas for work. However, this is not entirely representative for the actual distance between the rural and urban areas. Due to the lack of information about the real actual distances between the rural and urban areas in this research, this was the best alternative.

The results of the Pearson correlation do not match with the basic statistics on the Dutch commuters. It is therefore recommended to do further research on the relationship between the share of commuters and the development of rural areas. It might be possible that if the research is conducted once more, applying different variables to define the development of rural areas, different results might appear.

On the basis of the collected data, it was possible to answer the first and last secondary question of this research. However, it was not possible to answer the secondary question on the socio-economic characteristics. The main reason for this might be the relatively small sample size. Therefore, it was not possible to draw conclusions for the wider population, but it was possible to draw conclusions for the respondents. Subsequently, it was not possible to research the role of the socio-economic characteristics of the commuters in the relationship between the share of commuters and the development of rural areas. For future research it is be recommended to formulate the aforementioned questions in a more clear and concise manner and to expand the survey to include more respondents. To this end, it might be possible to draw conclusions for the wider population and to research the role of the socio-economic characteristics in the relationship between the share of commuters and the development of rural areas.

5.2 Recommendations

For further research, it is recommended to expand the survey to be able to draw conclusions for the whole population of the North of the Netherlands. This would also make it possible to draw conclusions for the whole population of the municipalities. Additionally, it is recommended to look at different variables on where commuters could have an impact. For instances, the exact distance between the rural and urban areas, could be applied to draw more sophisticated conclusions instead of using the kilometers travelled to work by the respondent. In addition, it would be interesting as well to look at a different range of years, to be able to compare different timespans with each other.

Lastly, as mentioned in section 4.1, the variation in the percentage the respondents do their grocery shopping in the municipality they live in, is interesting. In future research it is recommended to focus on the locations where the commuters do their grocery shopping, as the literature shows that those commuters might have a positive role in the local market due to their expenditures. However, instead of focusing on the municipalities the commuters do their grocery shopping in, it is recommended to focus on the local areas. To this end, the problems of not having a supermarket nearby in the same municipality will be avoided. All in all, applying these recommendations will ensure that future research into this topic will be enhanced.

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Appendices

6.1 Appendix I - Survey

Hallo, ik doe momenteel de Master Economic Geography aan de Rijksuniversiteit Groningen. Voor mijn Master scriptie doe ik onderzoek naar de effecten die forenzen hebben op rurale gebieden in het noorden van Nederland. Werkt u in een andere gemeente dan u woont? Dan zoek ik u! De enquête is volledig anoniem en er wordt vertrouwelijk omgegaan met de informatie. U kunt op elk moment stoppen met de enquête, en u hoeft niet elke vraag te beantwoorden. De enquête duurt ongeveer 2 minuten. Mocht u vragen of opmerkingen hebben, kunt u mij een mail sturen via: *s.m.van.der.spek@student.rug.nl*.

Alvast hartelijk bedankt voor het invullen van deze enquête!

In welke gemeente woont u?

……

In welke gemeente werkt u?

……

Hoeveel kilometer reist u ongeveer per dag op en neer naar werk?

a. Minder dan 5 kilometer
b. Tussen de 5 en 10 kilometer
c. Tussen de 10 en 15 kilomter
d. Tussen de 15 en 20 kilometer
e. Tussen de 20 en 25 kilometer
f. Meer dan 25 kilometer

Hoeveel minuten reist u ongeveer per dag op en neer naar werk?

……

Met welk vervoersmiddel gaat u naar werk? U kunt meerdere opties aankruisen.

a. Openbaarvervoer
b. Auto
c. Fiets
d. Lopend
e. Anders, namelijk……

Doet u aan 'carpoolen'*?

a. Ja
b. Nee
c. Niet van toepassing

* Carpoolen is het delen van de auto met mensen voor woon-werk verkeer.

Wat voor soort beroep oefent u uit?

……

Wat voor opleiding heeft u als laatste afgerond?

a. Middelbare school
b. MBO
c. HBO
d. Universiteit
e. Gepromoveerd
f. Anders, namelijk……

In wat voor soort huis woont u?

a. Rijtjes huis
b. Vrijstaand huis
c. Flat / appartement
d. Villa
e. Anders, namelijk……

Wat is uw geschatte besteedbare huishoudensinkomen* in euro's?

……

* Het besteedbare huishoudensinkomen is het nettobedrag dat een huishouden op jaarbasis te besteden heeft (Bron: CBS).

Hoeveel kinderen heeft u die jonger zijn dan 18 jaar?

……

Uit hoeveel volwassenen bestaat het huishouden? (Kinderen die 18 jaar of ouder zijn en in het huis wonen, worden meegerekend)

……

Hoe vaak doet u uw boodschappen in de gemeente waar u woont? Geef aan in percentages.

……

Is / denkt u dat uw huisprijs hoger is geworden in de laatste 10 jaar?

a. Ja
b. Nee

Is / denkt u dat uw huis meer waard is geworden in vergelijking met de rest van uw omgeving?

a. Ja
b. Nee

Wat is uw leeftijd?

……

Wat is uw geslacht?

a. Vrouw
b. Man
c. Anders

Dit is het einde van de enquête.
Hartelijk bedankt voor het invullen!

6.2 Appendix II – Tables of numbers of outflow

High number of outflow	Number of commuters x 1.000	Income x 1.000	House prices in €
Almere	60,8	25,9	206 317
Amsterdam	129,2	22,2	358 976
's Gravenhage	98,6	22,7	244 849
Rotterdam	121,4	20,9	202 401
Tilburg	49,5	22,7	208 106
Average		***22,9***	***244 129***
Low number of outflow			
Baarle Nassau	1,4	26,4	266 280
Ten Boer	2,5	26,5	165 414
Eemnes	2,9	29,5	346 441
Hattem	3,3	26,7	253 125
Loppersum	2,8	24,4	194 173
Average		***26,7***	***245 086***

Table 7: Average income and house prices for municipalities with the highest and the lowest numbers of outflow in all the municipalities in the Netherlands in 2016

High number of outflow	Number of commuters x 1.000	Income x 1.000	House prices in €
Groningen	27,2	18,9	186 685
Leeuwarden	14,8	22,4	164 437
Sudwest Fryslan	14,9	24,5	199 005
Assen	14,4	24,6	190 911
Emmen	16,7	23,2	171 741
Average		***22,7***	***182 555***
Low number of outflow			
Bellingwedde	2	25,9	173653
Ten Boer	2,5	26,5	165 414
De marne	2	23,4	137 381
Het Bildt	2,6	25,5	151 635
Ferwerderadiel	2,5	23,7	159 043
Average		***25***	***157 425***

Table 8: Average income and house prices for municipalities with the highest and the lowest numbers of outflow in all the municipalities in the North of the Netherlands in 2016

High number of outflow	Number of commuters x 1.000	Income x 1.000	House prices in €
Groningen	27,2	18,9	186 685
Leeuwarden	14,8	22,4	164 437
Sudwest Fryslan	14,9	24,5	199 005
Assen	14,4	24,6	190 911
Emmen	16,7	23,2	171 741
Average		***22,7***	***182 555***
Low number of outflow			
Appingedam	3,1	21,8	164 504
Bedum	3,1	25,4	183 710
Pekela	3,4	21,9	127 804
Dongeradeel	4,3	23,1	165 522
Harlingen	2,9	22,3	179 087
Average		***22,9***	***164 125***

Table 9: Average income and house prices for municipalities with the highest and the lowest numbers of outflow in all the urban municipalities in the North of the Netherlands in 2016

High number of outflow	Number of commuters x 1.000	Income x 1.000	House prices in €
De Fryske Marren	12,7	25,3	219 532
Opsterland	8,4	25,2	208 722
Coevorden	8,2	24,8	213 934
Midden-Drenthe	9,3	26,1	225 661
Tynaarlo	9,7	28,6	262 004
Average		***26***	***225 970***
Low number of outflow			
Bellingwedde	2	25,9	173653
Ten Boer	2,5	26,5	165 414
De marne	2	23,4	137 381
Het Bildt	2,6	25,5	151 635
Ferwerderadiel	2,5	23,7	159 043
Average		***25***	***157 425***

Table 10: Average income and house prices for municipalities with the highest and the lowest numbers of outflow in all the rural municipalities in the North of the Netherlands in 2016

High number of outflow	**Number of commuters x 1.000**	**Income x 1.000**	**House prices in €**
Bronckhorst	9,7	26,8	245 747
Hollands Kroon	13,9	26,2	206 855
Leudal	10,9	27,2	215 193
Midden-Drenthe	9,3	26,1	225 661
Tynaarlo	9,7	28,6	262 004
Average		***26,9***	***231 092***
Low number of outflow			
Baarle Nassau	1,4	26,4	266 280
Renswoude	1,4	27,8	253 922
De Marne	2	23,4	137 381
Mook en Middelaar	2,2	29,6	269 317
Noord-Beveland	1,7	25,9	184 198
Average		***26,6***	***214 219***

Table 11: Average income and house prices for municipalities with the highest and the lowest numbers of outflow in all the rural municipalities of the Netherlands in 2016

6.3 Appendix III – Extensive explanation Pearson correlations

6.3.1 All municipalities of the Netherlands

In the year 2014, 398 municipalities of the Netherlands are included in the research. The relationship between the percentage of commuters (M=68.3, SD=11.7) and the average house prices (M=223407.9, SD=55626.9) and the average standardized household income (M=25, SD=2.5) are visible in table 12. This correlation is for both variables significant at the significance level of 0.01 (2-tailed), namely *p=.000*. This table makes also clear, there is a positive medium level correlation between the percentage of commuters and the average standardized household income (*r=.422)*. There is a weak correlation between the percentage of commuters and the average house prices (*r=.260)*. This means, when the percentage of commuters increases, the average standardized household income and the average house prices will increase as well, but at different strengths.

2014		**Percentage Commuters**	**Average Standardized Household Income**	**Average House prices**
Percentage Commuters	Pearson -Correlation	1	.422**	.260**
	Sig. (2-tailed)		.000	.000
	N	398	398	398

Table 12: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the Netherlands in 2014

For the year 2015, 388 municipalities are included in the analysis. The relationship between the percentage of commuters (M=68.4, SD=12) and the average house prices (M=229181.1, SD=60615.4) and the average standardized household income (M=26.1, SD=2.9) are visible in table 13. As is shown, both the correlations are significant. The correlation between the commuters and the average standardized household income is significant at the significance level of 0.01(*p=.000)*, and the correlation between the commuters and the average house prices is significant at the 0.05 level (*p=.047)*. There is a positive weak correlation between the variables average standardized income and the average house prices, and the percentage of commuters (*r=.028* and *r=.102)*. This means, when the percentage commuters increase, the average house prices and the average standardized household income will increase as well.

2015		**Percentage Commuters**	**Average Standardized Household Income**	**Average House prices**
Percentage Commuters	Pearson -Correlation	1	.208**	.102*
	Sig. (2-tailed)		.000	.047
	N	388	382	383

Table 13: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the Netherlands in 2015

For the year 2016, 385 municipalities are included. The relationship between the percentage of commuters (M=68, SD=12.4), and the average house prices (M=241772.5, SD=62506,6) and the average standardized household income (M=26.5, SD=2.3) are

shown in table 14. Here, both the correlations are significant at the significance level of 0.01 (2-tailed), namely *p=.000*. Between the percentage commuters and the average standardized household income is a positive medium level correlation (*r=.497)*. In addition, between the variables percentage commuters and the average house price is a positive weak level correlation (*r=.251).* This means that when the percentage commuters are increasing, the average standardized income and the average house price will increase as well. Only, the average standardized income will increase faster compared to the average house prices.

2016		**Percentage Commuters**	**Average Standardized Household Income**	**Average House prices**
Percentage Commuters	Pearson -Correlation	1	.497**	.251**
	Sig. (2-tailed)		.000	.000
	N	385	371	385

Table 14: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the Netherlands in 2016

Out of the results it becomes clear that on the scale of the Netherlands, there is a positive correlation between the percentage of commuters, and the average standardized household income and the average house prices. This means that commuters have a positive effect on the standardized income and the house prices; when the number of commuters is increasing, the standardized income and the house prices will increase as well.

In figure 9, the scatterplots of the three correlations of all the municipalities in the Netherlands are shown. As is visible, we distinguish between the urban and rural municipalities; blue circles are urban municipalities and the green circles are rural municipalities. There are two clusters visible in the figures, the urban municipalities are especially clustered at the left of the scatterplot, and the rural municipalities are clustered at the right of the scatterplot. The finding that the rural municipalities are clustered at the right of the scatterplot is in line with the CBS (2013), where they state that mostly people from rural areas commute to urban areas. Therefore, rural areas have a higher percentage of commuters compared to urban areas.

The regression lines within the scatterplots all indicate a positive correlation between the percentage commuters and the average house prices and the average standardized household income. However, due to the clusters, it might be that the correlation is differently compared to when focusing on the two clusters independently. Therefore, this research will focus on the two clusters independently in the next chapters to see if the correlation will change.

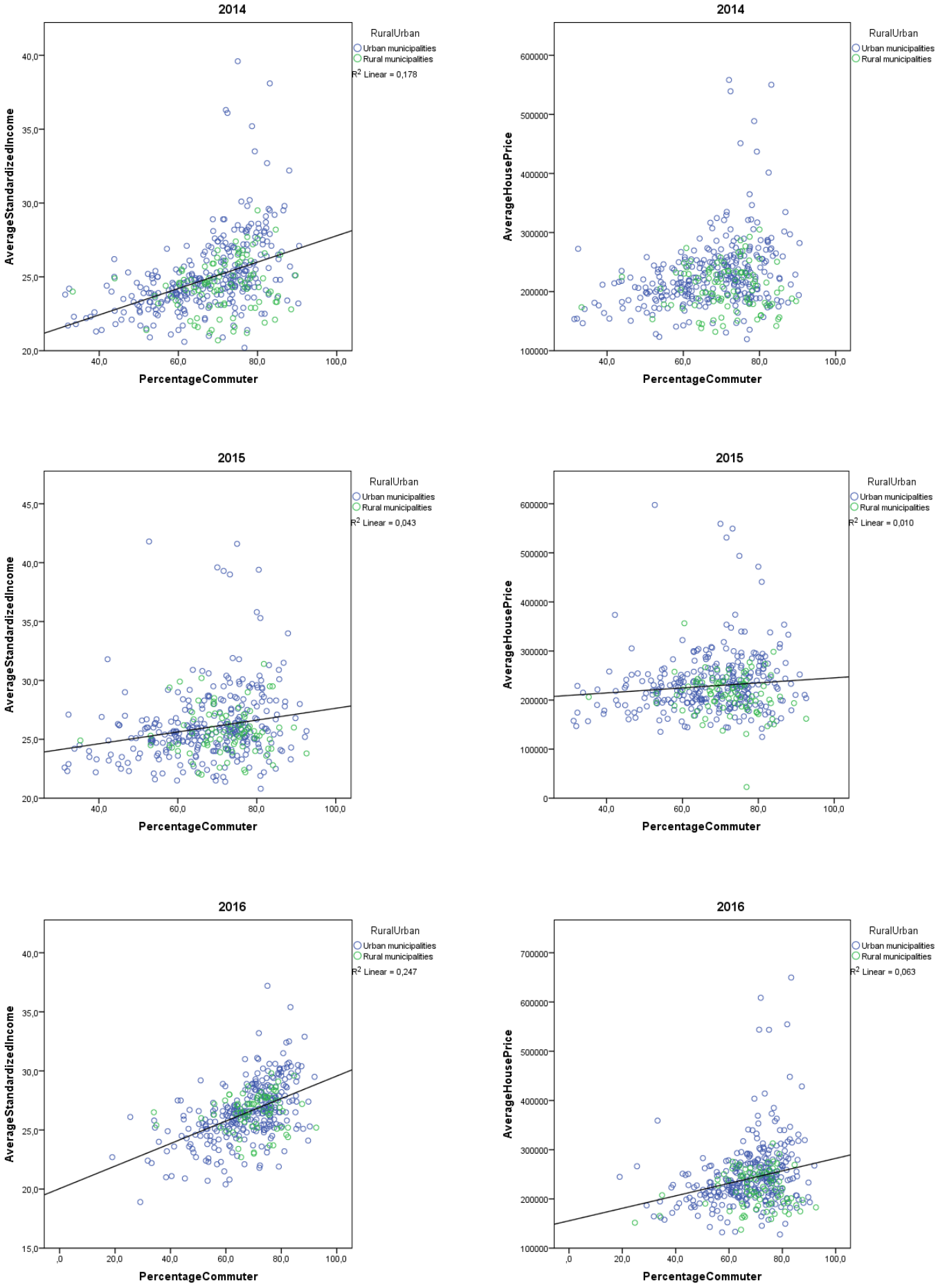

Figure 9: Scatterplots of percentage commuters and average house prices and standardized household income for all the municipalities in the Netherlands for the years 2014 to 2016.

6.3.2 Rural municipalities in the Netherlands

In addition to the correlations on the scale of the Netherlands, this research will also analyze the correlations for all the rural municipalities of the Netherlands. In the year 2014, there are 96 rural municipalities, excluding the Wadden Islands municipalities. The relationship between the percentage of commuters (M=71.2, SD=9.5) and the average house prices (M=206869.6, SD=38494.5) and the average standardized household income (M=24.4, SD=1.8) are visible in table 15. Only the correlation between the percentage of commuters and the average standardized income is significant at the significant level of 0.01 (2-tailed), namely p=.045. There is a positive weak level correlation between these two variables. However, the correlation between the percentage of commuters and the average house prices is not significant at the significance level of 0.05. This means that there is not a correlation between the two variables.

2014		**Percentage Commuters**	**Average Standardized Household Income**	**Average House prices**
Percentage Commuters	Pearson -Correlation	1	.205*	.009
	Sig. (2-tailed)		.045	.934
	N	96	96	96

Table 15: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the rural municipalities of the Netherlands in 2014.

For the year 2015, 82 municipalities are included in the analysis. The relationship between the percentage of commuters (M=71.9, SD=9) and the average house prices (M=211016.5, SD=43527.6) and the average standardized household income (M=25.7, SD=1.9) is visible in table 16. Both the correlations are not significant at the significance level of 0.05. From the results it becomes clear that there is no correlation between the three variables.

2015		**Percentage Commuters**	**Average Standardized Household Income**	**Average House prices**
Percentage Commuters	Pearson -Correlation	1	.024	-.128
	Sig. (2-tailed)		.832	.254
	N	82	81	81

Table 16: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the rural municipalities of the Netherlands in 2015.

2016		Percentage Commuters	Average Standardized Household Income	Average House prices
Percentage Commuters	Pearson -Correlation	1	.129	.098
	Sig. (2-tailed)		.287	.391
	N	79	70	79

Table 17: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the rural municipalities of the Netherlands in 2016.

In the year 2016, there are 79 municipalities included in the analysis. The relationship between the percentage of commuters (M=70.3, SD=11.2) and the average house prices (M=220462.8, SD=37947.7) and the average standardized household income (M=26.5, SD=1.6) is visible in table 17. As well as in 2015, both the correlations are not significant at the significance level of 0.05. These results make it clear that there is no relation between the percentage of commuters and the average standardized household income and the average house prices.

Out of the results it becomes clear that on the scale of the rural municipalities of the Netherlands, there is in general no correlation between the percentage of commuters, and the average standardized household income and the average house prices. There is, however, a positive weak correlation between the percentage commuters and the standardized income in rural municipalities in the Netherlands in 2014.

The scatterplots of the correlations of the rural municipalities in the Netherlands are visible in figure 10. The first thing that strikes out is that not every correlation is positive anymore. In the correlation between the percentage commuters and the average house prices in 2015, the correlation has a negative slope. This supports the argumentation mentioned before, that it is important to focus on the two clusters separately, as they might show different results. However, as shown and mentioned before, the correlations between the percentage commuters and the average house prices and the average standardized household income in the rural municipalities in the Netherlands are not significant.

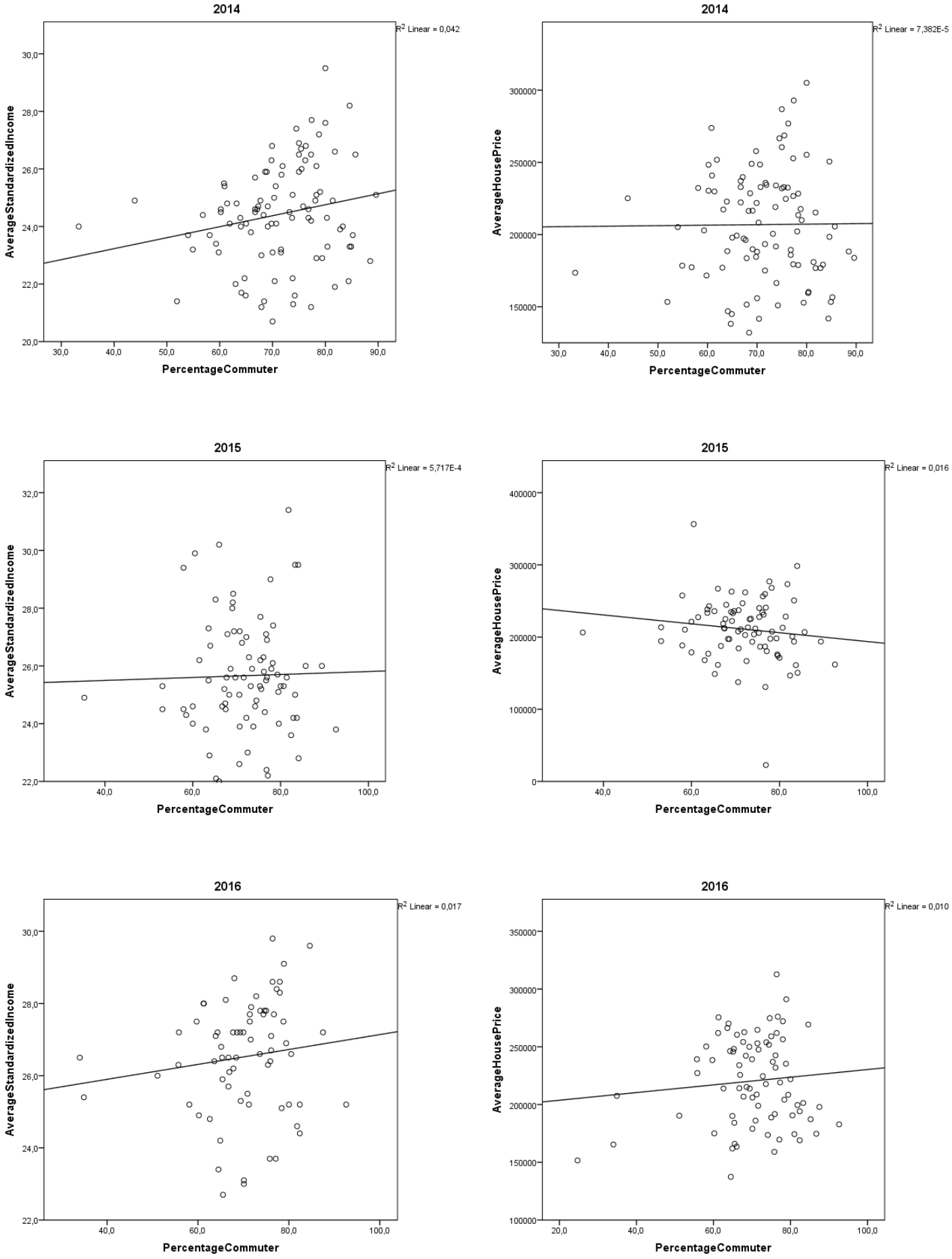

Figure 10: Scatterplots of percentage commuters and average house prices and standardized household income for the rural municipalities in the Netherlands for the years 2014 to 2016.

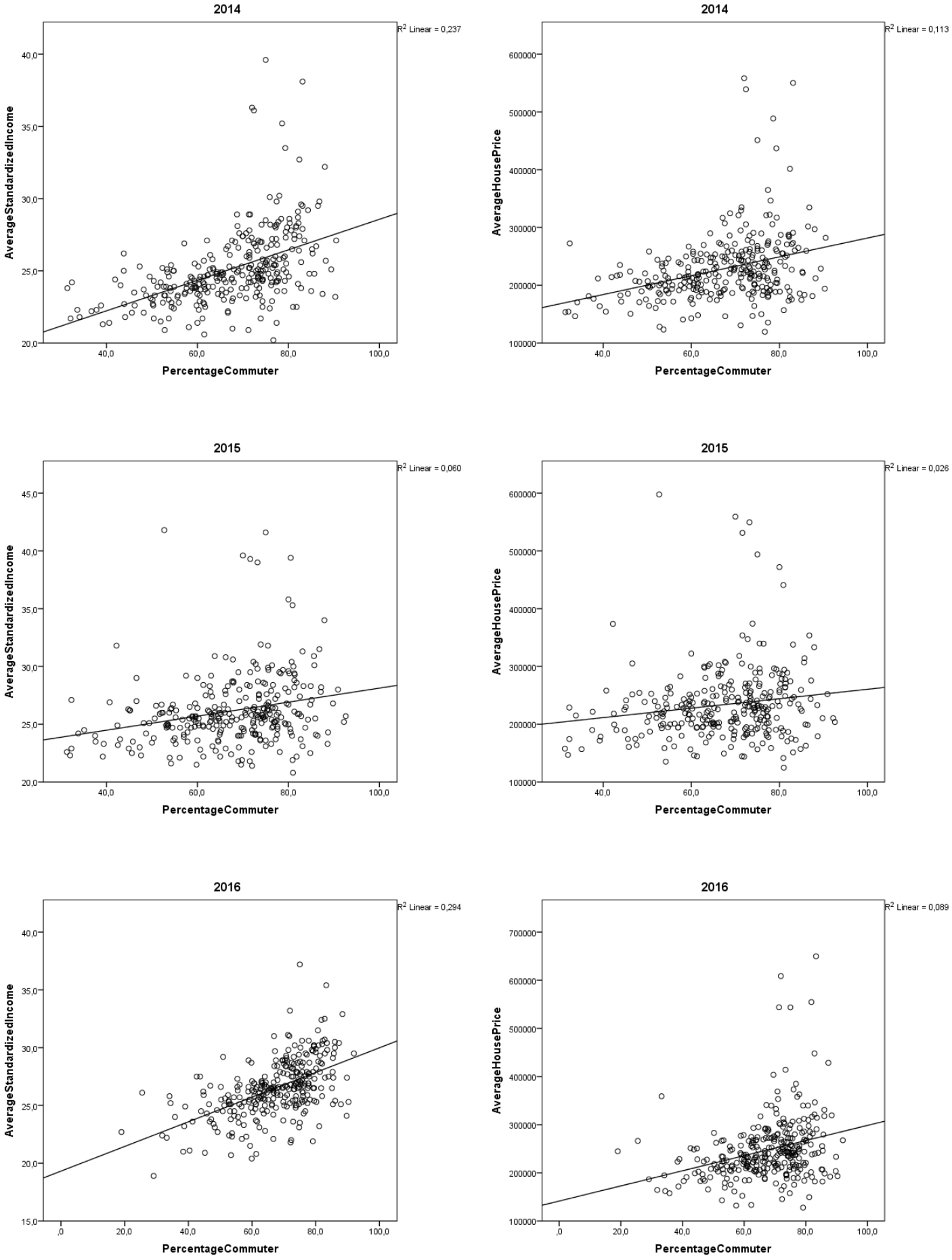

Figure 11: Scatterplots of percentage commuters and average house prices and standardized household income for the urban municipalities in the Netherlands for the years 2014 to 2016.

6.3.3 Urban municipalities in the Netherlands

Next to focusing on the rural municipalities in the Netherlands, it is also important to focus on the other cluster, namely the urban municipalities in the Netherlands. For the year 2014, 302 municipalities are included. The relationship between the percentage commuters (M=67.4, SD=12.2) and the average house prices (M=228665.2, SD=59148.9) and the average standardized household income (M=25.1, SD=2.6) is visible in table 18. As is visible, both the correlations are significant at the 0.01 significance level (2-tailed), namely *p=.000*. There is a positive medium level correlation between the percentage commuters, and the average house prices and the average standardized household income (*r=.487* and *r=.336*).

2014		**Percentage Commuters**	**Average Standardized Household Income**	**Average House prices**
Percentage Commuters	Pearson -Correlation	1	.487**	.336**
	Sig. (2-tailed)		.000	.000
	N	302	302	302

Table 18: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in urban municipalities in the Netherlands in 2014

For the year 2015, 306 municipalities are included. The relationship between the percentage commuters (M=67.5, SD=12.5) and the average house prices (M=234053, SD=63614,5) and the average standardized household income (M=26.1, SD=3.1) are visible in table 19. As is visible in the table, both the correlations are significant at the significance level of 0.01 (2-tailed). Next to that, there is a weak correlation between the percentage commuters, and the average house prices and the average standardized household income.

2015		**Percentage Commuters**	**Average Standardized Household Income**	**Average House prices**
Percentage Commuters	Pearson -Correlation	1	.245**	.161**
	Sig. (2-tailed)		.000	.005
	N	306	301	302

Table 19: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in urban municipalities in the Netherlands in 2015

For the year 2016, there are as well 306 municipalities included. The relationship between the percentage commuters (M=67.4, SD=12.6) and the average house prices (M=247274, SD = 66353,7) and the average standardized household income (M=26.5, SD=2.5) is visible in table 20. As well as in the other years, both the correlations are significant at the significance level of 0.01 (2-tailed). There is a strong correlation between the percentage commuters and the average standardized household income, and there is a medium weak correlation between the percentage commuters and the average house prices.

2016		Percentage Commuters	Average Standardized Household Income	Average House prices
Percentage Commuters	Pearson -Correlation	1	.542**	.298**
	Sig. (2-tailed)		.000	.000
	N	306	301	306

Table 20: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in urban municipalities in the Netherlands in 2016

Out of the results it becomes clear that there is in general a positive correlation between the percentage commuters, and the average house prices and the standardized household income in urban municipalities in the Netherlands. The strength of the correlations differs, however, per year. This means, when the percentage commuters in a municipality increase, the house prices and the standardized household income will increase as well.

Figure 11 shows the scatterplots of the urban municipalities in the Netherlands. First of all, as is visible, all the scatterplots have a positive slope. This is in line with the results of the scatterplots of all the municipalities in the Netherlands. From the scatterplots it becomes clear that when percentage of commuters increase, the average house prices and the average standardized household income will increase as well, but at different strengths.

6.3.4 The North of the Netherlands

This research also focuses on the scale of the North of the Netherlands. The municipalities of the provinces Groningen, Friesland and Drenthe are included in the analysis. Here, also the Wadden islands municipalities are excluded. Those municipalities are: Ameland, Schiermonnikoog, Terschelling and Vlieland.

For the year 2014, 55 municipalities are included in the research. The relationship between the percentage commuters (M=67.3, SD= 13.7) and the average house prices (M=171040.7, SD=29850.2) and the average standardized household income (M=22.7, SD=1.6) is visible in table 21. As is visible, the correlation between the percentage commuters and the average standardized household income is significant at the significance level of 0.01 (2-tailed), namely *p=.004*. There is a positive medium level correlation between the two variables. However, the correlation between the percentage commuters and the average house prices is not significant at the 0.05 significance level (*p=.159)*. There is no correlation between the two variables.

2014		Percentage Commuters	Average Standardized Household Income	Average House prices
Percentage Commuters	Pearson -Correlation	1	.387*	.193
	Sig. (2-tailed)		.004	.159
	N	55	55	55

Table 21: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the North of the Netherlands in 2014

Additionally, for the year 2015, 55 municipalities are included in the analysis. The relationship between the percentage commuters (M=67.4, SD= 13.7) and the average house prices (M=190049.81, SD=43352.8) and the average standardized household income (M=24.6, SD=2.9) is visible in table 22. Both the correlations are not significant at the significance level of 0.05 (*p=.140* and *p=.715*). This means that there is no correlation between the percentage commuters, and the average standardized household income and the average house prices.

2015		**Percentage Commuters**	**Average Standardized Household Income**	**Average House prices**
Percentage Commuters	Pearson -Correlation	1	.205	-.051
	Sig. (2-tailed)		.140	.715
	N	55	53	54

Table 22: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the North of the Netherlands in 2015

2016		**Percentage Commuters**	**Average Standardized Household Income**	**Average House prices**
Percentage Commuters	Pearson -Correlation	1	.427**	.260
	Sig. (2-tailed)		.003	.055
	N	55	45	55

Table 23: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the North of the Netherlands in 2016

For the year 2016, also 55 municipalities are included in the analysis. The relationship between the percentage commuters (M=65.3, SD=15.5) and the average house prices (M=188378.9, SD=33186.5) and the average standardized household income (M=24.4, SD=1.9) is visible in table 23. The correlation between the percentage commuters and the average standardized income is significant at the significance level of 0.01 (2-tailed), namely *p=.003*. There is a positive medium level correlation between the two variables. The correlation between the percentage commuters and the average house prices is, however, not significant at the 0.05 significance level (*p=.055*). This means that there is no correlation between the two variables.

Out of the results it becomes clear that on the one hand there is in general a positive medium level correlation between the percentage commuters and the average standardized household income (excluding the year 2015). When the percentage commuters are increases, the average standardized household income will increase as well. On the other hand, it becomes clear that there is no correlation between the percentage commuters and the average house prices. For all the three years, the correlations were not significant.

In figure 15 are the scatterplots of the correlations of the municipalities in the North of the Netherlands visible. As is visible in the figure, there is a made a distinction between the rural and urban municipalities: urban municipalities are blue and rural municipalities are green. Similar to the scatterplots of the municipalities of the

Netherlands, there are two clusters visible. On the left side of the scatterplot, mostly urban municipalities are clustered and on the right side of the scatterplot mostly rural municipalities are clustered. The slopes of the lines are positive with all the correlations. However, due to the clusters, this slope might be different when focusing on the two clusters independently. Therefore, in the next chapters, there will be a distinction made as well between the urban and rural municipalities in the North of the Netherlands.

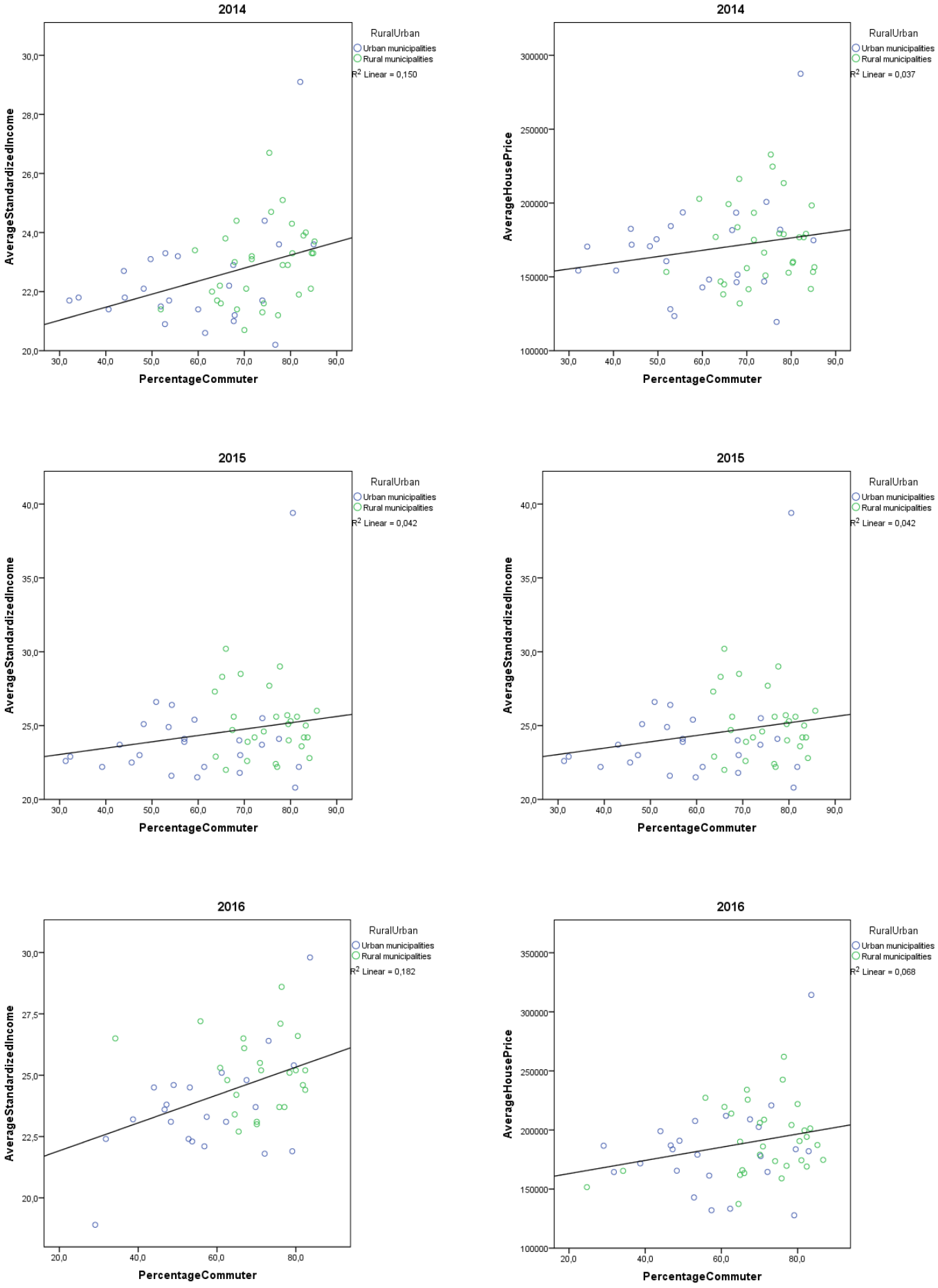

Figure 15: Scatterplots of percentage commuters and average house prices and standardized household income for the municipalities in the North of the Netherlands for the years 2014 to 2016.

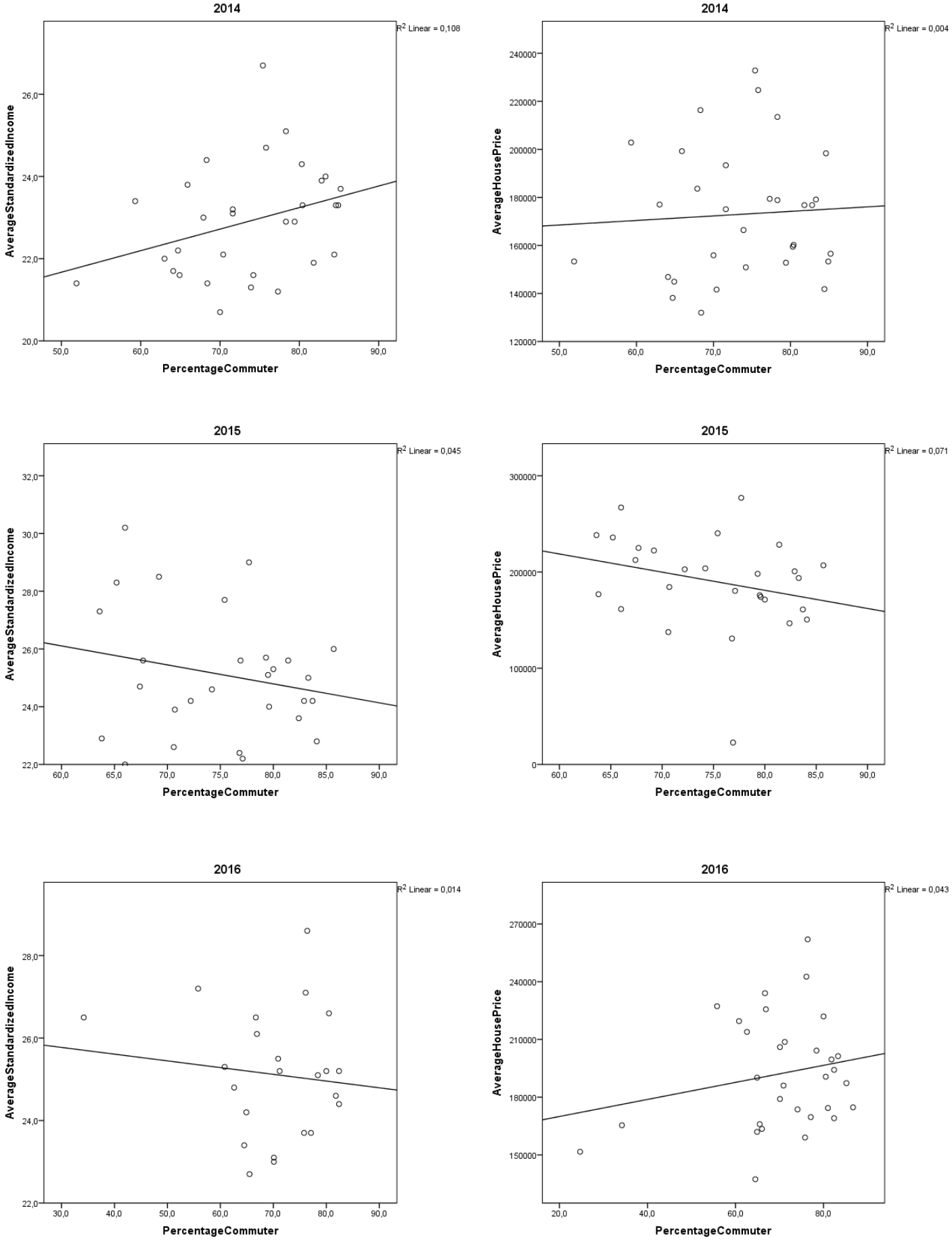

Figure 16: Scatterplots of percentage commuters and average house prices and standardized household income for the rural municipalities in the North of the Netherlands for the years 2014 to 2016.

6.3.5 Rural municipalities in the North of the Netherlands

From the 55 municipalities in the North of the Netherlands, 31 are defined as rural muncipalities in 2014. The relationship between the percentage commuters (M=73.6, SD=8.5) and the average house prices (M=172969.8, SD=26851.5) and the average standardized household income (M=22.9, SD=1.3) is visible in table 24. Both the correlations are not significant on the significance level of 0.05. This means that there is no correlation between the percentage commuters, and the average standardized household income and the average house prices.

2014		**Percentage Commuters**	**Average Standardized Household Income**	**Average House prices**
Percentage Commuters	Pearson -Correlation	1	.329	.060
	Sig. (2-tailed)		.070	.750
	N	31	31	31

Table 24: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the rural municipalities in the North of the Netherlands in 2014.

For the year 2015, 31 municipalities are defined as rural. However, only from 29 municipalities the data was available about the percentage of commuters. The relationship between the percentage commuters (M=74.9, SD=6.9) and the average house prices (M=190235.6, SD=49425.1) and the average standardized household income (M=25.1, SD=2.2) is visible in table 25. Here, both the correlations are not significant at the significance level of 0.05. This means that there is no correlation between the percentage commuters, and the average standardized household income and the average house prices.

2015		**Percentage Commuters**	**Average Standardized Household Income**	**Average House prices**
Percentage Commuters	Pearson -Correlation	1	-.212	-.266
	Sig. (2-tailed)		.279	.172
	N	29	28	28

Table 25: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the rural municipalities in the North of the Netherlands in 2015.

In the year 2016, also 31 municipalities are defined as rural municipalities. The relationship between percentage of commuters (M=70.4, SD=13.6) and the average house prices (M=192280.45, SD=29162.3) and the average house prices (M=25.1, SD=1.5) is visible in table 26. Also here, both the correlations are not significant at the significance level of 0.05. This means that, also in 2016, there is no correlation between the percentage commuters, and the average standardized household income and the average house prices.

2016		Percentage Commuters	Average Standardized Household Income	Average House prices
Percentage Commuters	Pearson -Correlation	1	-.117	.206
	Sig. (2-tailed)		.594	.266
	N	31	23	31

Table 26: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the rural municipalities in the North of the Netherlands in 2016.

Out of the results of the rural municipalities in the North of the Netherlands it becomes clear that there is no relationship between the percentage of commuters, and the average standardized household income and the average house prices: all the Pearson correlations are not significant.

Figure 16 shows the scatterplots of the correlations of the rural municipalities in the North of the Netherlands for the years 2014 to 2016. As is shown, not all the slopes of the correlations are positive anymore, compared to the scatterplots of all the municipalities in Northern Netherlands. This supports the argumentation, as mentioned before, to look at the two different clusters separately. From the scatterplots it becomes clear, that there is not really one correlation visible; most dots are located randomly. This supports the findings of the Pearson correlation, which shows that there is no relationship between the percentage of commuters and the average standardized household income and the average house prices for the rural municipalities Northern Netherlands.

6.3.6 Urban municipalities in the North of the Netherlands

From the 55 municipalities in 2014 in the North of the Netherlands, 24 are defined as urban municipalities. The relationship between the percentage commuters (M=59.2, SD=14.9) and the average house prices (M=168548.8, SD=33764,7) and the average standardized household income (M=22.4, SD=1.8) is visible in table 27. Both the correlations are not significant at the significance level of 0.05. This means that there is no correlation between the percentage commuters, and the average standardized household income and the average house prices.

2014		Percentage Commuters	Average Standardized Household Income	Average House prices
Percentage Commuters	Pearson -Correlation	1	.374	.257
	Sig. (2-tailed)		.072	.226
	N	24	24	24

Table 27: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the urban municipalities in the North of the Netherlands in 2014.

In the year 2015, 26 municipalities in Northern Netherlands are defined as urban municipalities according to the 'omgevingsadressendichtheid' (Dulk et al., 1992). The relationship between the percentage commuters (M=59, SD=14.5) and the average house prices (M=189849.7, SD=36689.6) and the average standardized household income (M=24.1, SD=3.5) is visible in table 28. Here as well, both correlations are not

significant at the significance level of 0.05. This means that there is no correlation between the percentage commuters and the average house prices and the average standardized household income in urban municipalities in the North of the Netherlands in 2015.

2015		Percentage Commuters	Average Standardized Household Income	Average House prices
Percentage Commuters	Pearson -Correlation	1	.243	.058
	Sig. (2-tailed)		.242	.779
	N	26	25	26

Table 28: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the urban municipalities in the North of the Netherlands in 2015.

For 2016, 24 municipalities are defined as urban municipalities in the North of the Netherlands. The relationship between the percentage commuters (M=58.8, SD=15.6) and the average house prices (M=183339.4, SD=37898.6) and the average standardized household income (M=23.7, SD=2.1) is visible in table 29. The correlation between the percentage commuters and the average standardize household income is significant at the 0.01 level (2-tailed), namely *p=.009*. There is a strong correlation between the two variables (*r=.543*). However, when looking at the correlation between the percentage commuters and the average house prices, it becomes clear that the correlation is not significant at the 0.05 significance level. This means that there is no correlation between the two variables.

2016		Percentage Commuters	Average Standardized Household Income	Average House prices
Percentage Commuters	Pearson -Correlation	1	.543**	.249
	Sig. (2-tailed)		.009	.241
	N	24	22	24

Table 29: SPSS outcomes of the Pearson correlation between the percentage of commuters, standardized income and house prices in the urban municipalities in the North of the Netherlands in 2016.

Out of the results of the urban municipalities in the North of the Netherlands it becomes clear that there is no relationship between the percentage of commuters, and the average standardized household income and the average house prices. Almost all the Pearson correlations are not significant, only the correlation between the percentage commuters and the average standardized household income in 2016 is significant.

Figure 17 shows the scatterplots of the correlations of the urban municipalities in the North of the Netherlands for the years 2014 to 2016. As it becomes clear from the figure, all the slopes of the correlations are positive. This is in line with the scatterplots of all the municipalities of the North of the Netherlands. However, as the results of the Pearson correlation show, (almost) none of the correlations are significant.

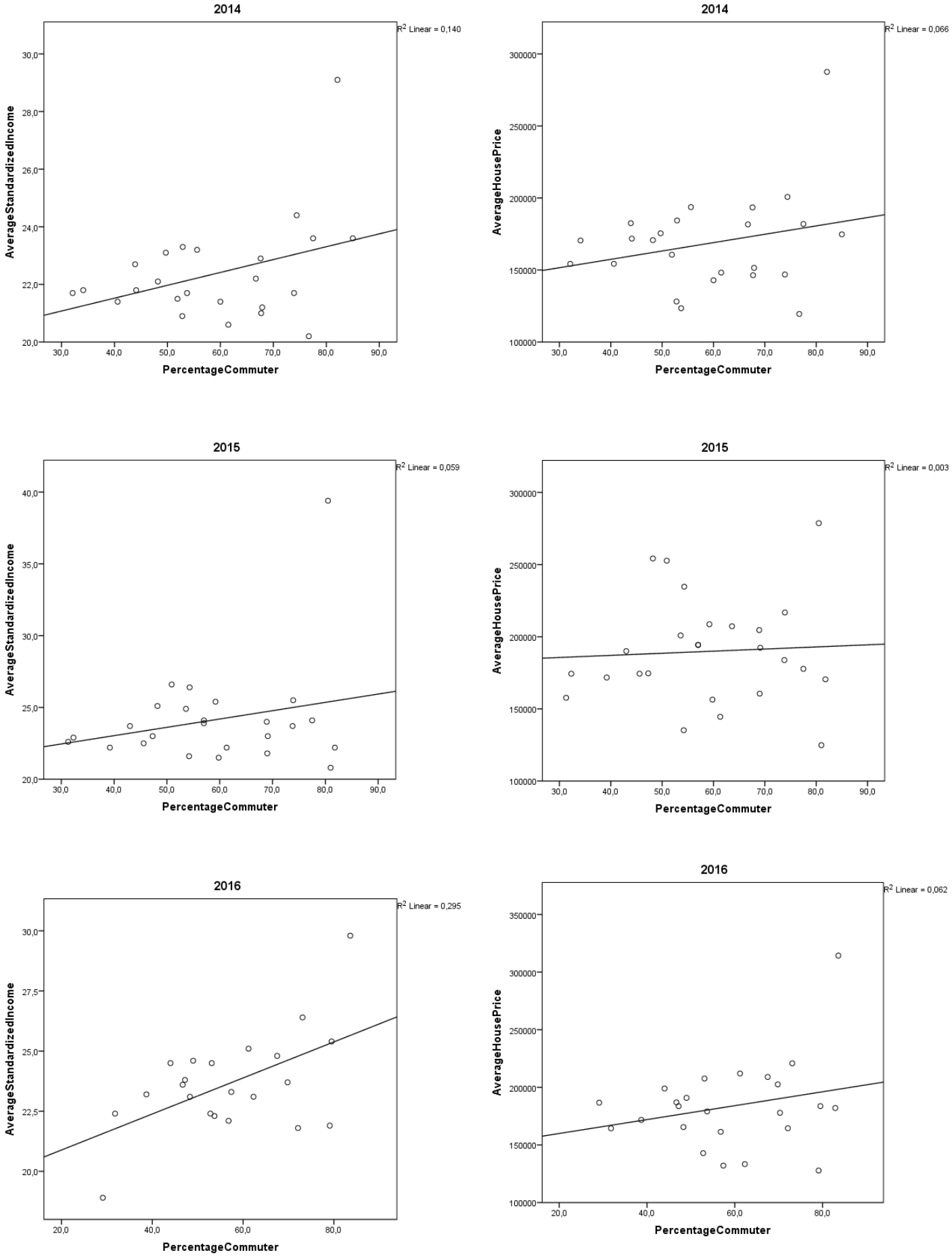

Figure 17: Scatterplots of percentage commuters and average house prices and standardized household income for the urban municipalities in the North of the Netherlands for the years 2014 to 2016.