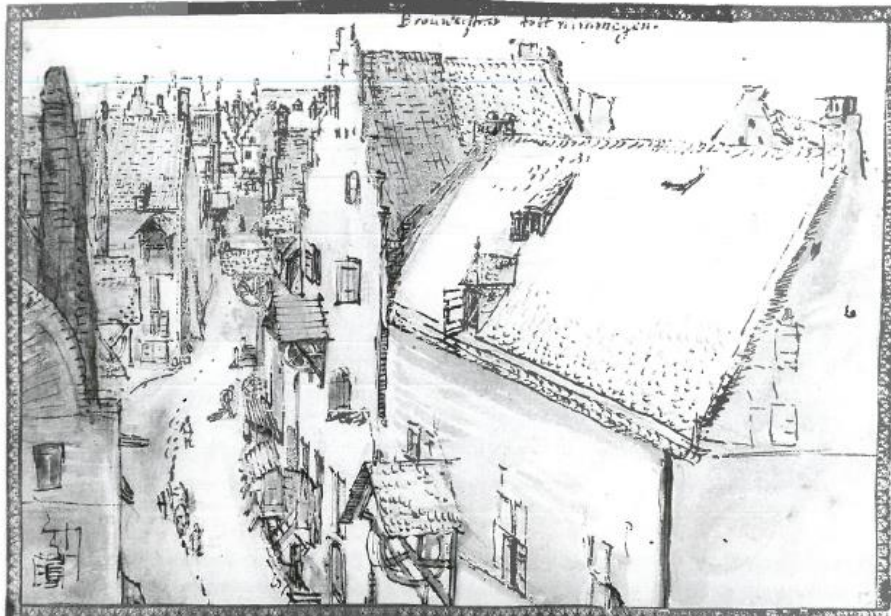# Rich versus poor

Linking economic inequality to residential segregation in early modern cities

Including a case study of Nijmegen (1694)

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Ink drawing on front page: *Brouwerstraat* in Nijmegen, by Feltman (ca. 1647)

SOURCE: G. Lemmens, *Nijmegen in 1669 Vogelvluchtgezicht van Hendrik Feltman*, Museumstukken 9 (Nijmegen 2003) 7.

Content

Chapter 1

Introduction

In April 2016, photographer Johnny Miller posted several photo's on Facebook which showed how inequality of wealth and privilege in Southern Africa is literally visible from bird's-eye view. His photos went viral all over the world. Reactions to his work show that it is not only inequality of affluence itself which may evoke social upheaval: its visibility is just as influential.[1] On his website unequalscenes.com, Miller continues to portray scenes of inequality: 'to see things from a different perspective – see things as they really are'.[2]

Mexico City © Johnny Miller   Randburg-Bloubosrand, South Africa © Johnny Miller

This thesis aims to provide similar pictures for late seventeenth century Nijmegen, a middle-sized city in the Dutch Republic. It will do so by studying an income tax register from 1694. This register offers the opportunity to reconstruct levels of income inequality among households in the city, locate these households on the level of wards and streets, and study these aspects for particular groups by comparing their names to other sources. By visualizing this data on a map, drones become redundant to answer the question how income inequality in late seventeenth century Nijmegen was reflected in residential patterns.

By answering this question, the thesis contributes to the debate on patterns of residential segregation in pre-modern cities, as well as to the debate on the development of economic inequality in early modern European cities. Although both strands of literature are related, they are barely discussed in relation to one another. The possible reciprocal influence of economic inequality levels

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[1] 'Vanuit de lucht zie je apartheid', *De Volkskrant* (22 Nov 2016); http://www.abc.net.au/news/2016-06-23/photographer-highlights-divide-cape-town-rich-and-poor-aerial/7535570 (24 January 2017); https://www.facebook.com/unequalscenes/ (24 January 2017).
[2] http://unequalscenes.com/aboutcontact-1 (24 January 2017).

and residential segregation by economic affluence has barely been tested so far for early modern European cities.

Research on past and present-day societies, however, indicates that residential segregation may influence socio-economic mobility – the ability to change one's socio-economic conditions. Strong residential segregation by income probably limits socio-economic mobility.[3] Among modern, developed countries, high economic inequality is associated with little economic mobility across generations.[4] Historical research indicates that financial means may also have been of decisive influence in early modern people's life chances.[5] If neighbourhoods could influence people's life chances positively and negatively in early modern cities, residential segregation levels could have been related to economic inequality levels in the city as a whole.

Research on residential patterns indicates that social status may have been of influence in people's residential choices in early modern cities.[6] Increasing differences in financial means of inhabitants in a city could thus have resulted in the wish of more affluent groups to distinguish themselves from less affluent groups, for example by creating more physical distance between their residences.

Next to this, causal relationships are suggested between social upheaval on the one hand, and economic inequality and its reflection in residential patterns on the other hand.[7] The above mentioned example of Johnny Miller's work alone already indicates the possible influence of the visibility of economic inequality in such processes. Gaining an insight into inequality and residential segregation

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[3] E.g. on past societies: W. Scheidel, *The great leveler: violence and the history of inequality from the Stone Age to the twenty-first century* (Princeton 2017) 277; E.g. on modern societies: Ibidem, 20; B. Graham, P. Sharkey, 'Mobility and the metropolis. How communities factor into economic mobility', a report from the Pew charitable trusts (December 2013); R. Chetty, N. Hendren, 'The effects of neighborhoods on intergenerational mobility I: Childhood exposure effects', NBER working paper 23001 (2017), published within the Equality of Opportunity Project; Idem, 'The effects of neighborhoods on intergenerational mobility II: County-level estimates', NBER working paper 23002 (2017), published within the Equality of Opportunity Project. The effect of residential segregation on socio-economic mobility is still debated. For example, sociologist Emily Miltenburg recently questioned the effect of Dutch neighbours on each other's socio-economic prospects: http://www.nwo.nl/actueel/nieuws/2017/magw/overheid-richt-je-op-bewoner-in-achterstandswijk-en-niet-op-buurt-als-geheel.html (29 March 2017).

[4] Scheidel, *The great leveler*, 20.

[5] J. Hanus, 'Taxes & occupation. In search of social class in the 16th-century Low Countries', in: B. Van de Putte, E. Buyst (eds.), *Measuring social stratification in historical research. An overview of old problems and new methods, Belgisch Tijdschrift voor Nieuwste Geschiedenis* 40 (2010) 179-214.

[6] C. Lesger, M.H.D. van Leeuwen, 'Residential segregation from the sixteenth to the nineteenth century: evidence from the Netherlands', *Journal of Interdisciplinary History* 42-3 (2012) 333-369, q.v. 340; D. Denecke, 'Social status and place of residence in preindustrial German towns: recent studies in social topography', in: Idem, G. Shaw (eds.), *Urban historical geography. Recent progress in Britain and Germany*, Cambridge Studies in Historical Geography 10 (Cambridge 1988) 125-140.

[7] E.g. D. Cannadine, 'Residential differentiation in nineteenth-century towns: from shapes on the ground to shapes in society', in: J.H. Johnson, C.G. Pooley (eds.), *The structure of nineteenth century cities* (New York 1982) 235-252, q.v. 243-247; H. Canbakal, 'Wealth and inequality in Ottoman Bursa, 1500-1840', unpublished conference paper for "New perspectives in Ottoman economic history", Yale University, November 2012; Scheidel, *The great leveler*, passim.

may thus be considered essential in understanding socio-political developments in past societies. In addition, a better understanding of the influence of residential patterns and inequality levels on past societies may provide a historical perspective on questions regarding the influence of these aspects in present-day societies.

This thesis aims to stimulate the interrelated study of economic inequality and residential segregation in the early modern period. It offers a methodical analysis of both strands of literature in order to illuminate the possibility to study them in relation to one another, and proposes solutions for methodological impediments perceived. Cities in the Low Countries, for which publications are available on both subjects, will be taken as a test case. Since both strands of literature are still in need for more quantitative data, this thesis adds data for pre-industrial Nijmegen to the test case.

It has been chosen to refer to these cities as 'Netherlandish' cities, in order to explicitly include parts of present-day Belgium which were also part of the Low Countries during medieval and early modern times. In relation to the debate on economic inequality, publications discussing Amsterdam (1742), Delft (1742), Dordrecht (1742), Rotterdam (1742), Deventer (1750), Kampen (1750), Zwolle (1750), and 's-Hertogenbosch (1501/02, 1506/07, 1512/13, 1552, 1557) will be studied in detail. With regard to the debate on residential patterns, publications examining Amsterdam (1832), Alkmaar (1632, 1733, 1832), Delft (1832), Leiden (1581), Gent (1795/96), Kortrijk (1795/96), and 's-Hertogenbosch (1502/03, 1505/06, 1511/12, 1547, 1552) are available.

By adding data on Nijmegen for 1694, a more representative dataset is established. Nijmegen was located in the eastern part of the Northern Low Countries, in the province of Guelders, a region not included in both debates so far. Cities in Holland, a region in the western part of the Northern Low Countries, and Flanders, in the Southern Low Countries, are best represented. Some data on economic inequality in the eastern part of the Northern Low Countries is also available, particularly on the province of Overijssel.[8] Inter-regional differences in the Low Countries make it vital to add data from additional regions such as Guelders.

The eastern part of the Northern Low countries experienced a different political and socio-economic development from cities in the western and southern parts. For example, during most of the early modern period, the Northern and Southern Low Countries were politically separated. Within the Low Countries, individual regions, such as Holland and Guelders, were self-governing to a large extent. Nijmegen's economy was stagnating in the sixteenth and seventeenth centuries, comparable to the situation in most European cities. Cities in the North Sea area, on the other hand, experienced

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[8] For Holland, Amsterdam, Delft, Dordrecht, Rotterdam, Alkmaar, Delft, and Leiden are included in the test case; for Flanders, Kortrijk and Gent; for Overijssel, Deventer, Kampen, and Zwolle. 's-Hertogenbosch, the other city in the test case of Netherlandish cities, was situated in Brabant.

unprecedented development and expansion: a phenomenon dubbed the "Little Divergence". Next to this, cities in the eastern regions were more likely to be situated in a border region of the Low Countries, and therefore more frequently under direct military threat than westward cities. Nijmegen shared characteristics with cities in various regions, and may therefore function as a litmus test for conclusions drawn on economic inequality and residential segregation in the Low Countries so far.

Excellent source material has been preserved to study economic inequality and residential patterns in Nijmegen. The above mentioned registers of an income tax called *Familiegeld* will be at the basis of the analysis. As will be shown in chapter 4, these registers offer information for the whole of society: from the destitute to the most affluent, including those who were exempt from paying tax. It has been chosen to study the tax registers of 1694 in detail. 1694 was a comparatively average year. War activities of the Dutch Republic were the reason for levying this tax, but such a situation can hardly be considered unusual. The city was not under immediate threat of military attack, epidemics, food shortage, or socio-political upheaval. Seven registers of the income tax have completely been preserved for the seventeenth century: those of 1677, 1689, and 1694-1698, which admits the possibility to take this study as a starting point for future research of several of these registers in a row, or an interval-based study. Moreover, the data of 1694 may be compared to a register containing decisions of the city council in the same year. These decisions offer indispensable information to the levying of the tax, as well as information on various individuals, which enables a modest prosopographic approach of the data.

The next chapter provides an overview of both debates central to this thesis: the debate about the development of pre-modern economic inequality, and the debate on patterns and causes of pre-modern residential segregation within cities. Chapter 3 briefly characterizes late seventeenth-century Nijmegen, followed by an extensive source criticism on the tax registers in chapter 4. Chapter 5 discusses economic inequality in Nijmegen, and compares these results to the situation in other parts of the Low Countries. Based on this analysis, interim conclusions will be drawn on the suitableness of the current data in a study of the potential interrelation of economic inequality and residential segregation. Chapter 5 reconstructs residential patterns in late seventeenth-century Nijmegen, followed by a comparison to residential patterns found in other early modern Netherlandish cities. The possibilities of comparing residential patterns between different cities will be debated. The last chapter will combine the thesis' findings to discuss what may be concluded upon the possibility of studying the interrelation of economic inequality and residential segregation in the early modern period.

Chapter 2

Economic inequality and residential segregation in early modern European cities: a *Status Quaestionis*

This chapter offers an overview of both debates central to this thesis: the debate about the development of early modern economic inequality, and the debate on patterns and causes of early modern residential segregation in cities. First, the most recent explanations for developments in pre-modern economic inequality will be discussed. Secondly, the debate on residential segregation in early modern cities will be characterized. In conclusion, both debates will be discussed in relation to one another.

2.1 Explaining changes in pre-modern economic inequality

'Economic inequality' is a term generalizing all kinds of aspects related to differences in economic well-being of individuals or groups. It includes their possessions, their income, and financial capacity. Researchers are not always clear about the exact meaning of terms employed in their study. Many studies distinguish between 'wealth inequality' and 'income inequality', often without defining these terms. Wealth could include immovable goods such as buildings and land, but also movable goods such as furniture, or financial assets. Wealth inequality could refer to both the distribution of differences in value of possessions and the distribution of income from possessions. Income inequality could refer to the total income distribution, including income from wealth, or the income distribution of specific kinds of sources. Income may, for instance, result from wages, real estate, or gifts. The debate about economic inequality would benefit from more clear use of terminology.

In this thesis, the term 'economic inequality' is used as a term collecting all aspects discussed above. The over-all aim of studies focussing of economic aspects of inequality in early modern societies is to understand economic inequality in general. References to income inequality or wealth inequality have been understand as terms generalizing total income inequality and differences in wealth respectively. 'Total income' is understood as income from all kinds of sources imaginable and 'wealth' as all kinds of wealth imaginable. Chapter 4 and 5 will illuminate on the possibility of estimating total income inequality in seventeenth-century Nijmegen. Chapter 5 will discuss the comparability of studies on economic inequality levels in the test case of Netherlandish cities.

The long-term development of economic inequality has long been regarded in the light of Kuznets' hypothesis. This hypothesis, developed in the 1950s, provides a model in the form of an inverted U-shaped curve for the relationship between mean income per capita and the development of income

inequality. Starting from the idea that average per capita inequality is higher in urban populations than in rural populations, it supposes income inequality in industrializing (and hence urbanizing) countries as a whole to increase at first. After a certain turning point at which sufficiently high income levels have been reached, income inequality would automatically decrease and eventually stabilize – all other conditions presupposed to be equal.[9]

Kuznets' hypothesis was based on twentieth century data, and the debate it evoked initially focussed on developments after the Industrial Revolution. In the 1990s, Van Zanden pioneered in trying to relate pre-industrial economic development and long-term changes in income and wealth inequality in multiple towns and villages. Comparing Dutch, Italian, British and German data, he confirmed Kuznets starting point that, on the whole, economic inequality seems lower in rural areas and smaller towns than in larger cities. Based on long-term data for the Dutch province of Holland, Van Zanden subsequently showed an increase in inequality during pre-modern economic expansion from the sixteenth century onwards. He suggested a 'super Kuznets curve', whose origins should be located in the early modern period.[10] Since the 1990s, empirical research mostly confirms the over-all growth in income and wealth inequality in European regions during the centuries prior to the Industrial Revolution – a study of Portugal being the only exception so far. However, the relation of this over-all inequality increase to economic growth has recently been questioned.[11]

The interest in the debate about the main determinants of long-term changes in economic inequality has recently increased among economists and historians. This attention has been fostered by the upswing of income inequality within many rich, Western countries from the 1980s onwards.[12] Although critique on Kuznets' hypothesis had not been absent before, this development contradicted the hypothesis beyond all doubt. The Industrial Revolution is still regarded as a breaking period for both economic growth and trends in economic inequality, but there is a growing interest to reconcile theories on inequality movements in the pre-modern and modern period.

Especially for the pre-industrial period, empirical research on economic inequality in different areas still has to grow in order to test theoretical models thoroughly. Nevertheless, a growing number of studies indicate that the development of income and wealth disparity in pre-industrial societies cannot be properly explained by per capita economic growth only. Attention has been drawn to political

[9] S. Kuznets, 'Economic growth and income inequality', *The American Economic Review* 45-1 (1955) 1-28.
[10] J.L. van Zanden, 'Tracing the beginning of the Kuznets curve: Western Europe during the early modern period', *The Economic History Review*, New Series 48-4 (1995) 643-664.
[11] G. Alfani, W. Ryckbosch, 'Growing apart in early modern Europe? A comparison of inequality trends in Italy and the Low Countries, 1500-1800', *Explorations in Economic History* 62 (2016) 143-153, q.v. 143-144; W. Ryckbosch, 'Economic inequality and growth before the industrial revolution: the case of the Low Countries (fourteenth to nineteenth centuries), *European Review of Economic History* 20-1 (2015) 1-22, q.v. 2-3.
[12] B. Milanović, *Global inequality. A new approach for the age of globalization* (London 2016) 4, 46-47; T. Piketty, *Le capital au XXI siècle* (Paris 2013) (Translated by A. Goldhammer, *Capital in the twenty-first century* (Cambridge, London 2014)) 15-16.

events, institutions and processes, the development of commodity prices, the fiscal-military state, processes of proletarianization, family systems and international trade as determinants of pre-modern inequality levels.[13]

An influential alternative for Kuznets hypothesis on the long-term development of economic inequality has been offered by the French economist Thomas Piketty in 2013.[14] He argues that in a capitalist economy, income inequality will rise, unless reverted by political events, processes and policies. In particular wars and progressive taxation are considered effective instruments of redistribution. Piketty distinguishes three components of income inequality: inequality in income from labour, inequality in the ownership of capital and the income it generates, and the correlation between these two components.[15] He emphasizes this distinction, because he supposes different economic, political and social mechanisms underlie these components. For the case of unequal incomes from labour, such mechanisms are, for example, supply and demand for different skills, the state of the educational system, and various rules and institutions that affect the operation of the labour market and the determination of wages. For the case of unequal incomes from capital, savings and investment behaviour, laws governing gift-giving and inheritance, and the operation of real estate and financial markets are named.

For income inequality as a whole, he reaches the conclusion that the principle destabilizing force in a market economy based on private property is the possibility for private rate of return on capital (annual profits, dividends, interest, etc.) to be significantly higher than the rate of economic growth (annual increase in income or output) for long periods of time. Since the majority of wealth is owned by a minority of the population, inequality will increase. Piketty states that the drop in inequality in the beginning of the twentieth century should therefore not be seen as a natural process, as Kuznets argued, but as a result of the First and Second World War and consequential political policies. Decreasing economic growth relative to return from capital, in turn, is regarded as the underling mechanism of late twentieth-century inequality growth in rich, Western countries.

Piketty aims at underpinning his theory by using data from the pre-industrial period onwards. He succeeds in providing an impression of the pattern and character of the wealth-income ratio at the national level in Western Europe and North America until 2010; most completely for France and Britain from the eighteenth century onwards.[16] His analysis of the evolution of economic inequality expressed in percentages of the population, however, is based on data from, at best, the nineteenth century

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[13] Alfani, Ryckbosch, 'Growing apart', 143-144.
[14] The following paragraphs are based on Piketty, *Capital*, passim.
[15] Piketty's defines capital as 'the sum total of nonhuman assets that can be owned and exchanged on some market. Capital includes all forms of real property [...] as well as financial and professional capital [...] used by firms and government agencies'. He uses the words 'capital' and 'wealth' interchangeably: Ibidem, 45-50.
[16] Ibidem, 113-234.

onwards.[17] He thus leaves questions on the evolution of economic inequality in a period in which the foundations of capital-driven economic growth were laid open for debate.[18] Furthermore, Piketty only focusses on developments on the level of nation states, which may be misleading especially for the early modern period in which economies and political policies were less nationally integrated than during the twentieth century. Moreover, the economies and political policies of France and Britain were more nationally integrated in the eighteenth century than those of other European countries, manifesting itself in the availability of the type of data Piketty is looking for.

According to the Serbian-American economist Branko Milanović, Piketty pays too little attention to the autonomous economic forces that may curb inequality.[19] In reaction to Kuznets and Piketty, Milanović launched the idea of 'Kuznets waves' or 'Kuznets circles' to describe the evolution of economic inequality in relation to economic development. Plotting inequality against time, he expects to see regular waves from the pre-industrial through the post-industrial period, as previous studies have shown. Plotting economic inequality against mean income per capita, however, will show irregular Kuznets waves before the Industrial Revolution, and regular Kuznets waves afterwards. According to Milanović, since the 1980s, we are thus not in the upswing of the U-shaped Kuznets wave as Piketty proposes, but in an upward swing of just another Kuznets wave.[20]

The difference between the expected pattern of changes in inequality versus mean income before and after the Industrial Revolution results from Milanović' presupposition that mean income was comparatively stagnant in the pre-industrial period. Malthusian checks would prevent mean income and wages to rise significantly in the long term. In other words, before the Industrial Revolution, there was no relationship between mean income level and the level of inequality. After the Industrial Revolution and the consequential sustained increase in mean income, inequality and mean income entered into a new relationship.[21]

Moreover, the maximum feasible inequality levels, named the 'inequality possibility frontier' by Milanović and co-authors, increased after the Industrial Revolution.[22] Starting from the assumption that everybody in a society must obtain at least a subsistence income, the inequality possibility frontier is an index for the situation in which an infinitesimally small elite in society receives all income, except for the amount necessary for everybody else to live at subsistence level. In post-industrial societies,

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[17] Ibidem, 271-467.
[18] Ryckbosch, 'Economic inequality and growth', 2.
[19] Milanović, *Global inequality*, 47-50.
[20] Ibidem, 50-59.
[21] Ibidem, 50-51.
[22] Idem, P.H. Lindert, J.G. Williamson, 'Pre-industrial inequality', *The Economic Journal* 121 (2011) 255-272.

total income rose, allowing the inequality possibility frontier to rise as well.[23] This explains the higher rate of inequality increase in European countries after the Industrial Revolution.

According to Milanović, in pre-industrial times, changes in economic inequality were driven by 'the vagaries of incidents' instead of 'systematic forces'.[24] Inequality was pushed downwards by the destructive character of events such as wars, civil conflict, and epidemics, and the reactions of institutions to these events. Such idiosyncratic events are described by Milanović as 'malign forces'. Within societies with a rising mean income, there are also 'benign forces' at work, such as social pressure through politics (think about socialism and trade unions) and widespread education.[25]

Milanović explains upward portions of Kuznets waves in the pre-industrial period by temporary increases in the mean income. For the case of long-term inequality increase in cities in the Southern Low Countries identified by Wouter Ryckbosch, Milanović suggests that the observed increase in mean income made it possible for the inequality possibility frontier to rise, which in turn opened the door for inequality to increase. Milanović thereby somewhat undermines his own hypothesis that the evolution of economic inequality and the economic development are not related in the pre-industrial period.

Around the same time of Milanović' publication, Ryckbosch himself, together with Guido Alfani, questioned the interrelation of economic inequality and economic development in pre-industrial times.[26] They compared cities from four European regions with divergent economic, political and institutional profiles: the Italian Sabaudian State and Florentine State, and the western parts of the Southern and Northern Low Countries. In addition to studies for other areas, they noted that, in spite of differences in the development of GDP per capita between 1500 and 1850, these areas all showed an increasing inequality trend. However, they also looked at the intensity of the process and the development of the degree of inequality actually produced relative to the inequality possibility frontier (the so-called 'inequality extraction ratio', a concept also introduced by Milanović and co-authors), which proofed to differ between the areas of study.

Alfani and Ryckbosch found that these differences could still not be explained by economic performance, nor by differences in inheritance and cohabitation systems. However, they suggest that representative political institutions and a comparatively progressive fiscal system with higher social expenditure probably repressed inequality growth in the Low Countries. This contradicts Milanović' idea that 'benign forces' were absent in the pre-modern period. Moreover, it favours Piketty's emphasis on the influence of progressive taxation as an efficient instrument of redistribution.

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[23] Milanović, *Global inequality*, 51-53.
[24] Ibidem, 69.
[25] Ibidem, 56.
[26] The next paragraphs are based on Alfani, Ryckbosch, 'Growing apart', 143-153.

Alfani and Ryckbosch further pose the hypotheses that aspects of the European 'proletarianization process', involving the growing concentration of capital and the means of production, and tendencies towards the formation of a stronger and more centralized fiscal-military state could account for similarities in the development of economic inequality. They come to the conclusion that the early modern period was 'an era where political, institutional, social, demographic, and economic factors more often worked to raise inequality rather than to depress it'.[27] In fact, Alfani and Ryckbosch show that processes on the European scale might have contributed to a general European trend, but that local factors could have had a decisive influence on disparities between regions. All of these studies display the need for more data on pre-modern inequality patterns to test existing theories.

2.2 Residential segregation in early modern European cities

Residential differentiation or segregation can be defined as the spatial distribution of socio-economic differentiation. Segregation is often associated with a more pronounced pattern, with clear underrepresentation and overrepresentation of population groups per city unit compared to the city's level average. Central to the debate on residential segregation are questions about general characteristics of spatial patterns in the distribution of socio-economic differentiation and the factors of influence on these patterns.

The second part of this chapter will first discuss two theories on residential segregation which have been of great influence on this debate. These theories were formulated in the 1960s and 1970s by Gideon Sjoberg and Jonathan Vance. The description of their models is followed by an overview of indicators of socio-economic differentiation which have been taken as a starting point in the study of residential segregation. The fourth subsection discusses observed patterns of residential segregation in quantitative studies of early modern cities. The adherence of these patterns to the models of Sjoberg and Vance, which have evolved into standard models, will be considered. The last subsection focusses on possible determinants of geographical patterns.

2.2.1 Sjoberg's pre-industrial city

One of the most influential researchers in the debate on pre-modern, urban residential patterns and its underlying mechanisms has been sociologist Gideon Sjoberg. He discerned two types of cities: pre-industrial cities, and industrial ones. He considered technology the key independent variable between these types: changes in the level of technology during industrialization fundamentally changed society. As a consequence, residential patterns in the city changed as well.

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[27] Alfani, Ryckbosch, 'Growing apart', 152.

According to Sjoberg, the industrial-urban society for example structurally differed from the pre-industrial, 'feudal' one in the characteristics of its class system. The industrial class system was more fluid, and achievement rather than ascription determined one's position in society. Furthermore, in the industrial city, the small, flexible, and conjugal family unit was the ideal norm. Norms were, however, more permissive rather than prescriptive compared to the pre-industrial society. The scale of the economic system grew, the complexity in the division of labour increased, and the economic system became more rational in character. Related to the specialization of labour did the educational system lay more emphasize on science, and the mass became lettered.[28]

In tune with the spirit of structuralism, Sjoberg searched for a universal model of residential patterns in the pre-industrial city: 'We seek to isolate for preindustrial cities structural universals, those elements that transcend cultural boundaries.'[29] By establishing a universal model, Sjoberg aimed to distinguish more carefully between unique cases and cities resembling a general pattern.[30] Based on examples of cities from all over the world in various time periods, he concluded that a typical pre-industrial city is characterized by a city centre 'which is the hub of governmental and religious activity more than of commercial ventures', and which is mainly inhabited by the elite. The elite in the centre were often accompanied by lower-class servants. This central location did not necessarily have to be the exact physical centre of the town. The more one approaches the city's periphery, the lower the social standing of its inhabitants. Next to this, the outskirts could host some agricultural activities of lower-class groups. 'Social class' predominantly determines the pattern, followed by kinship, occupational, and ethnic distinctions. Occupational groups can often be found in the same street or quarter, and some streets are dominated by members of the same family. Ethnic groups may form rather isolated worlds within the city.[31]

According to Sjoberg, spatial differentiation mainly resulted from the low status of technology in the pre-modern era, which severely limited people's travelling speed and the destinations within reach. The elite's success depended on mutual relations and communication. Therefore, they mainly lived near each other, in proximity of the most important, and centrally located buildings of the city: the main buildings of the religious, governmental, and educational institutions. Similarly, people from the same occupational groups tended to cluster, in order to improve the velocity of communication and transport. Sjoberg considers the prestige of living in the centre a factor of influence of secondary importance on residential patterns. Moreover, the city centre was considered most safe from military

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[28] G. Sjoberg, *The preindustrial city. Past and present* (New York 1960) 12.
[29] Ibidem, 5.
[30] Ibidem, 5, 322.
[31] Ibidem, 92-93, 95-103, 323-324.

attacks on the city. The city's poor and outcasts therefore lived in the periphery, the least central area of lowest prestige and highest risks.[32]

Sjoberg largely ignored factors other than centrality in the lay-out of his standard pre-industrial city. In particular his neglect of the influence of economic factors, such as changes in the financial means of inhabitants, and housing market mechanisms has been severely criticized.[33] In his differentiation between classes, financial means also played a marginal role only. His vision of merchants, for example, evoked much critique. Merchants are considered of humble status by Sjoberg, because of their pre-occupations with money-making. Some of them would be able to become part of the elite, but most of them would have been considered of lower class or even outcast groups. However, research showed that city councils dominated by merchants were no exception in pre-industrial Europe.[34] Nevertheless, Sjoberg's centrifugal model of a pre-industrial city with a certain elite in its centre and inhabitants of lower standing in the periphery still serves as a starting point in many studies. Such studies vary from an archaeological study of Amarna in Ancient Egypt to a quantitative historical study of early nineteenth century Amsterdam in the Netherlands.[35]

2.2.2 Vance's medieval and capitalist cities

Alternative, widely discussed models of pre-modern cities were formulated by urban geographer James E. Vance Jr. Based on qualitative, European sources, he distinguished two types of pre-modern cities relevant to this thesis: the medieval city, and the capitalist city. The capitalist city gave rise to socialism in the mid-nineteenth century, which, in turn, modified the morphology of cities again.[36]

According to Vance, morphological features of European, medieval cities south of the Alps differed substantially from those across the Alps.[37] The characteristics of the typical southern cities will not be

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[32] Ibidem.

[33] D. Vanneste, *De pre-industriële Vlaamse stad: een sociaal-economische survey. Interne differentiatie te Gent en te Kortrijk op het einde van de 18ᵈᵉ eeuw* (Leuven 1987) 28, 32.

[34] Sjoberg, *The preindustrial city*, 120, 183-184; Vanneste, *De pre-industriële Vlaamse stad*, 29; Lesger, Van Leeuwen, 'Residential segregation', 342.

[35] http://www.amarnaproject.com/pages/recent_projects/research_frameworks/before.shtml (27 July 2016, activity on the website between 2000 and 2010); C. Lesger, M.H.D. van Leeuwen, B. Vissers, 'Residentiële segregatie in vroeg-moderne steden. Amsterdam in de eerste helft van de negentiende eeuw', *Tijdschrift voor Sociale en Economische Geschiedenis* 3-2 (2013) 102-132.

[36] J.E. Vance Jr., 'Land assignment in the precapitalist, capitalist and postcapitalist city', *Economic Geography* 47-2 (1971) 101-120; Idem, *This scene of man. The role and structure of the city in the geography of Western civilization* (New York etc. 1977); A revised version of this work was published at the end of Vance's career: Idem, *The continuing city: urban morphology in Western civilization* (London 1990). His theory on pre-nineteenth-century cities did not change considerably, and his discussion of the medieval city was still considered 'one of the best [...] available': E. Jones, 'Reviewed work(s): The continuing city: urban morphology in Western civilization by James E. Vance', *Geogrphical Journal* 158-1 (1992) 103-104, q.v. 104.

[37] Vance, *This scene of man*, 131.

discussed here. This model of the 'city of factions', most typically found in Northern Italy, is of little relevance to this thesis.

Vance's northern medieval city is characterized by occupational zones. Rather than class or economic factors, occupation, dominated by the guilds, determined ones living place. The determinants of the location of particular occupational zones in the city are not described in detail. Occasional remarks in his work *This scene of man* show that he was well aware of the potential influence of factors such as the presence of water on the settlement of specific occupational groups.[38]

The only group that received a lot of Vance's attention are merchants. According to Vance, the urban elite largely consisted of these merchants; the noble aristocracy mainly resided outside the city. Noblemen did own some buildings in the city, but often stayed there for short periods of time only. Merchants resided in spots favourable to their activities, on places easy to find for potential customers unfamiliar with the city, and well accessible for goods. This meant that, according to Vance's model, most merchants are found near access roads within the city, around the market or near the river banks. Specific groups of different culture, ethnicity or religion than the native inhabitants of the city, such as Jews or the merchants of the Hanseatic League, could occupy a so-called 'quarter of tolerance', their own zone in the city. The location of other people not belonging to a guild, among which a significant number of rather poor people should be assumed, remains unclear.[39]

Within houses, residential segregation based on rank did occur. Parts of the building were assigned to activities related to the occupation in question, and the other floors were occupied by different members of the household community. Next to the master and his immediate family, apprentices and journeymen could constitute a vertical residential pattern.[40]

These patterns changed with the emergence of the capitalist system. Typically in the sixteenth and seventeenth centuries, a quantitative economy emerged and replaced the economy dominated by guild regulations which aimed at maintaining quality and prices. During this process, land and location became revaluated. Urban land was no longer simply held, and obtained as a consequence of the location of one's occupational group, but seen as property. As a consequence, land became seen as a source of income and economic status; an urban real estate market emerged. According to Vance, prices were chiefly determined by two factors: accessibility of the location for the economic activities envisioned, and the potential suitability of the location for housing. The quality and external status of the location of housing became important after capitalism had made social status more dependant on

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[38] Vance, *This scene of man*, 286; Vance, 'Land assignment', 103, 105, 115.
[39] Vance, *This scene of man*, 146, 147, 149, 155-158; Vance, 'Land assignment', 106.
[40] Vance, *This scene of man*, 152-153; Vance, 'Land assignment', 106, 115.

the accumulation of wealth. Next to this, housing places were rated by their distance from the envisioned workplace.[41]

The rise of land value of locations of commercial potential caused a separation of housing and working place, which changed macro-, and micro-segregation. Income and wealth rather than occupation became the chief determinant in macro-segregation, whereas vertical segregation on the level of houses diminished. The city centre's primordial function became commercial rather than residential. The well-to-do would have moved to new residences of good quality and preferable location, whereas economic means and available locations would determine the living places of less well-off through a filtering-down process. Eventually, this would result in a pattern of more well-to-do in new areas around the old city centre, and less well-off in older buildings in the centre: the reverse pattern of Sjoberg's pre-industrial city. Vance's model of the capitalist city is based on growing cities that reached a comparatively large size, such as Antwerp, Amsterdam, and Rouen. To what extent smaller cities also adhered to the described processes, is not discussed.[42]

2.2.3 Indicators of socio-economic differentiation

Researchers have focussed on different types of socio-economic differentiation in their search for residential patterns, and opinions vary about the main type influencing these patterns in early modern cities. According to Sjoberg, the main segregator in pre-industrial cities was social class. The main social distinction within his pre-industrial city is between the elite, the lower classes, and the outcast groups. The small, literate elite consisted at least of people engaged in leading functions in the main political, religious and educational institutions. Differentiation between the lower classes existed, but was insignificant in comparison to the differences between the elite and lower classes as a whole.

In Sjoberg's model, differentiation between the lower classes mainly depended on technological skills: unskilled workers were less esteemed than skilled artisans, who were, in turn, exceeded in social esteem by master artisans and prosperous merchants. Outcasts included, for example, the destitute, but also ethnic and religious minorities who did not necessarily have to be poor or of comparable financial means.[43] Sjoberg ignores several aspects which have proven to have been of decisive influence in pre-modern societies. Variations in the esteem of different types of occupations, for instance, are not discussed.

Vance, on the other hand, considered occupation to be the most important segregator in medieval cities north of the Alps. The type of guild was the primordial segregator on the level of neighbourhoods in the city, whereas functions within the guild determined vertical segregation. From

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[41] Vance, *This scene of man*, 217, 280-282, 305-307; Vance, 'Land assignment', 107, 108, 115.
[42] Vance, *This scene of man*, 217-218; Vance, 'Land assignment', 109-113, 115-116.
[43] Sjoberg, *The preindustrial city*, 118-123.

approximately the sixteenth century onwards, financial means became the decisive segregator. Differences in social esteem between guilds is not discussed by Vance neither. Multiple studies have shown that such esteem differences indeed existed.[44]

Vance and Sjoberg already provide us with several indicators of socio-economic differentiation which may be reflected in residential segregation. Within their work, political participation, religion, function in religious institutions, function in educational institutions, literacy, social esteem, ethnicity, occupation, occupational function, and financial means can be distinguished. Together with age, sex and juridical status, for example the possession of citizenship, marital status or noble status, these are the main aspects of socio-economic differentiation discussed in studies of residential patterns in early-modern, European cities. This thesis will mainly focus on the reflection of economic inequality in residential patterns.

2.2.4 Observed early-modern residential patterns

In 2012, historians Clé Lesger and Marco van Leeuwen carried out a survey of quantitative studies published on residential patterns in European cities of the sixteenth, seventeenth and eighteenth centuries.[45] Their comparative study is still representative for publications on residential patterns in early modern European cities. Especially Britain and France are well represented. Lesger and Van Leeuwen added data on three cities in Holland to this corpus.[46]

On the macro-level of neighbourhoods and districts, this survey showed that the geographical distribution of households of different financial means in early modern western European cities adhered to a large extent to Sjoberg's model: 'lower-income groups often occupied the peripheries of cities, whereas the well-to-do concentrated in the centres'.[47] These neighbourhoods were not homogenous in composition. Vance's hypothesis of an elite changing residence in the city centre for new residences in the peripheral areas could not be confirmed in most cases. In a few cases, such as Amsterdam, the number of households belonging to the social and economic elite increased in (new) neighbourhoods just outside the old city, but never to the extent Vance envisioned.[48]

Occupational clustering has not been perceived to the extent Vance described neither. Occupational clustering certainly did occur in pre-modern cities, but usually several members of a rather clustered occupational group are still found scattered through the city. Moreover, interdependent occupational groups, which can be expected to be found near one another according

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[44] For example, L.K. Little, *Indispensable immigrants. The wine porters of northern Italy and their saint, 1200-1800* (Manchester/ New York 2014) 57, 73; Denecke, 'Social status and place of residence', 133-136.

[45] Lesger, Van Leeuwen, 'Residential segregation', 335-340.

[46] Ibidem; Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie' 102-132.

[47] Lesger, Van Leeuwen, 'Residential segregation', 339.

[48] Ibidem, 355, 363, 368.

to Vance's model, are found in separate areas.[49] More generally, Lesger and Van Leeuwen conclude that studies on early modern cities so far do not provide evidence for a shift from pre-capitalist to capitalist cities in the sixteenth century, as Vance expected.[50] Their own research on Amsterdam somewhat contradicts this statement. They observed an increase in macro-segregation of people of different financial means in the late sixteenth and seventeenth century, even though the exodus of the economic elite was not as extensive as Vance's model suggests. This pattern of residential segregation of wealth was preserved at least until the beginning of the nineteenth century.[51]

In fact, the question whether residential patterns were influenced by a fundamental change of society during the sixteenth and seventeenth centuries cannot be properly answered yet. In 1975, the idea to test the influence of social change before the Industrial Revolution on residential patterns was appraised by geographer John Langton as the most innovative element in Vance's research.[52] It requires long-term studies to observe possible changes in residential patterns from the medieval period to the Industrial Revolution. Such studies preferably regard the same city, but otherwise at least a representative sample of comparable cities.

Studies referred to by Lesger and Van Leeuwen which provide information on residential patterns in the same city for multiple years, concern the period from the sixteenth century onwards only. Lesger and Van Leeuwen themselves aimed to attribute to the understanding of long-term residential segregation, but focussed on the period from the sixteenth to the twentieth century.[53] Rüthing's study of the German city of Höxter is an excellent example of a highly detailed study of social-economic change and residential patterns over a longer period of time, but his time frame 1482-1517 is too limited to study the influence of long-term developments.[54] To put it briefly, there is still a need for research on residential patterns that covers the period of the High Middle Ages to the Industrial Revolution. Such an approach would not only reveal the long-term development of residential patterns themselves, but also provide insight in the prime factors of influence over time.

The synthesis of Lesger and Van Leeuwen of residential patterns in early modern cities, as well as their own additional research, reveals a general pattern of meso-segregation on the level of streets, blocks of houses, and block-faces. Strikingly typified as "around the corner" segregation, the well-to-do are mainly found in the main streets, whereas middle-class groups mainly occupied side-streets,

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[49] J. Langton, 'Residential patterns in pre-industrial cities: some case studies from seventeenth-century Britain', *Transactions of the Institute of British Geographers* 65 (1975) 1-27, q.v. 16-23.
[50] Lesger, Van Leeuwen, 'Residential segregation', 342.
[51] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 123.
[52] Langton, 'Residential patterns', 6.
[53] Lesger, Van Leeuwen, 'Residential segregation', 334.
[54] H. Rüthing, 'Bemerkungen zur Sozialstruktur und Sozialtopographie Höxters am Ausgang des Mittelalters', in: B. Diestelkamp (ed.), *Beiträge zum spätmittelalterlichen Städtewesen* (Cologne/ Vienna 1982) 130-143; Idem, *Höxter um 1500: Analyse einer Stadtgesellschaft* (Paderborn 1986).

and the less well-off chiefly backstreets.[55] The addition of this segregation-level to the characterization of residential segregation in pre-modern cities, and its empirical foundation, has been one of the main accomplishments in this strand of literature in the past decades.

Quantitative research on micro-segregation within buildings, a key element in Vance's theory on pre-capitalist cities, is still very limited. Descriptions by contemporary inhabitants and other qualitative sources provide us with an impression of this phenomenon in early modern cities, but a quantitative analysis of differences and similarities between households living in the same building is almost never possible. Likely, micro-segregation was higher in densely populated cities.[56] Lesger and Van Leeuwen mention large cities in this respect, such as early modern Amsterdam.[57] The population of such immigrant-pulling cities grew comparatively fast, resulting in a high demand for housing. Garrison-cities such as Nijmegen, which were considerably smaller than Amsterdam, may offer another perspective on this hypothesis. Because of its military function on the line of defence, Nijmegen was not allowed to expand outside the existing city walls until the second half of the nineteenth century.[58] Bardet's study of Rouen, where small houses were the norm, shows that building traditions could also influence the development or absence of micro-segregation.[59] The tax registers central to this study do not allow a quantitative approach of micro-segregation in Nijmegen.

2.2.5 Determinants of residential patterns

The models of Sjoberg and Vance depend to a large extent on the factors of influence on residential patterns which they considered of overriding importance. This subsection will sum up various factors of influence so far discussed in literature on early modern European cities.

Sjoberg emphasized technology as an independent variable of decisive influence on cities' socio-economic structures and, consequentially, residential patterns. Low technological development resulted in friction of distance: low travelling rates made the elite eager to live near by institutions which, according to Sjoberg, dominated the city. The wish for a maximum safe environment also resulted in centrality as a main determinant of residential patterns in his model. Case studies have

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[55] Lesger, Van Leeuwen, 'Residential segregation', 339, 367-369; Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 104, 114-117.

[56] Lesger, Van Leeuwen, 'Residential segregation', 339. Lesger and Van Leeuwen even state that 'this type of segregation occurred only [Emphasis MAB] in densely populated cities that offered plentiful accomodation in the form of flats, or appartments'. However, no references to support this statement are offered.

[57] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 105, 117-118; Lesger, Van Leeuwen, 'Residential segregation', 365-366.

[58] http://www.noviomagus.nl/Historie/Historie2.htm (22 February 2017); http://www.noviomagus.nl/OudNijmegen/Stadswallen.htm (22 February 2017); P. Ekkers, T. Ganzevles, 'De vestingwerken van Nijmegen 1500-1800', in: J. Kuys, H. Bots (eds.), *Nijmegen. Geschiedenis van de oudste stad van Nederland. Middeleeuwen en Nieuwe Tijd* (Wormer 2005) 285-291, q.v. 291; Idem, 'Ruimtelijke orde en beleid binnen de vesting', in: Ibidem, 292-298, q.v. 293-295.

[59] Lesger, Van Leeuwen, 'Residential segregation', 337.

shown that determinants emphasized by Sjoberg only offer a partial explanation for the perceived patterns.

Although Vance also considered friction of distance a factor of influence to residential patterns, his main contribution to the debate concerns his emphasis on the existence and influence of a market of real estate.[60] According to Vance, with the rise of the capitalist city, the law of supply and demand became applicable to the value of parcels of land. Income and wealth of potential buyers and tenants determined to a large extent which land they choose to take up residence or commercial activities. Multiple, partly overlapping aspects could determine the value of a parcel, of which Vance discusses quality and location of housing, status of the location and building, and accessibility. Accessibility is considered especially important with regard to commercial activities. Vance predicted a filtering-down process, of the purchase of the most favoured parcels by the most affluent inhabitants, to the least favoured spots by the destitute. In his capitalist city, segregation based on financial means increased in respect to the medieval city.[61]

The influence of the real estate market has been confirmed by empirical, quantitative research on early modern cities.[62] Other factors of influence on the value of real estate have received attention as well, and factors named by Vance were studied in greater detail. Among these aspects are social distance (the physical distance between people from different social-economic groups), social status, view, surface area, smell, noise, and safety.[63]

A factor of influence Sjoberg did not discuss, and which Vance considers of minor importance in the capitalist city, are governmental housing policies. During the pre-modern period, housing policies did occur, though. They have chiefly been influential with regard to the commercial activities of certain occupational groups. For example as a consequence of the smell they sent forth or security reasons, certain activities were restricted to particular areas in the city.[64] Studies on residential segregation in early modern cities have only paid attention to governmental housing policies to a limited extent. The possibility of city planning of areas designated as housing zones is recognized, but the functioning of the local housing and rental market has been studied only limitedly.[65] This thesis will not focus on this lacuna neither.

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[60] Langton, 'Residential patterns', 21-22; Lesger, Van Leeuwen, 'Residential segregation', 342, 355, 368.

[61] Vance, 'Land assignment', 109-113.

[62] Lesger, Van Leeuwen, 'Residential segregation', 342, 368.

[63] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 106-107, 119-127; Denecke, 'Social status and place of residence'.

[64] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 121.

[65] E.g. Langton, 'Residential patterns', 22; For Amsterdam it is known that, apart from almhouses, rental prices were determined by the free market according to the laws of supply and demand between circa 1550 and 1850. Lesger and Van Leeuwen implicitly presume these findings are applicable for all Dutch rental prices. In this case, 'Dutch' should probably be understood as cities and towns in the county of Holland: Lesger, Van Leeuwen, 'Residential segregation', 343.

City size may have also been of influence on residential patterns. Apart from the attention to friction of distance, this aspect has received little attention so far with regard to early modern cities.[66] For nineteenth century cities, city size, especially population growth connected to industrialization, is considered an important factor of influence to the increasing degree of residential segregation.[67]

For pre-industrial cities, Vanneste is one of the only researchers taking city size into account. The population sizes of the Flemish cities made her choice for two case studies: the larger city of Gent, and the middle-size city of Kortrijk. Vanneste concluded that patterns of residential segregation in 1799 were more pronounced and more complex in Gent than in Kortrijk.[68] Preliminary research on late sixteenth and seventeenth century Amsterdam shows that geographical separation of groups of different financial means increased when the city expanded and new areas were built, a process greatly influenced by the town government.[69] Next to this, segregation on the level of houses is thought to have existed more, or even exclusively, in densely populated cities.[70]

Most researchers discussing residential patterns in pre-modern cities focus on one city only, which explains their lack of attention to the influence of the size of the city. Neither did Vanneste and Lesger and Van Leeuwen compare their results on the influence of city size to cities outside their own case. Moreover, comparisons of cities of different sizes have only been made based on population sizes. The size of the city itself may also have been of influence, and particularly its population density.

2.3 Studying economic inequality in relation to residential segregation

The debate on the development of economic inequality in the early modern period, discussed in the first half of this chapter, regards cities as entities. On the other hand, the debate on residential segregation in these cities studies specific parts of the city in relation to one another. Although it is generally acknowledged that these residential patterns are related to (economic) inequality levels in the city as a whole, the possible reciprocal influence of these processes receives little attention in the study of early modern cities.

In the introduction to this thesis, it has already been mentioned that neighbourhoods probably influenced people's life chances positively and negatively in early modern cities. Consequently, residential segregation levels could have been related to economic inequality levels in the city as a

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[66] Denecke, 'Social status and place of residence', 127-128.

[67] C.G. Pooley, 'Choice and constraint in the nineteenth-century city: a basis for residential differentiation', in: Johnson, Pooley, *The structure of nineteenth century cities*, 199-234, q.v. 202, 204; Cannadine, 'Residential differentiation in nineteenth-century towns', 246.

[68] Vanneste, *De pre-industriële Vlaamse stad*, 70-75, 184.

[69] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 123, 368. A quantitative-geographical analysis of residential patterns in Amsterdam has only been published for 1832.

[70] Lesger, Van Leeuwen, 'Residential segregation', 339.

whole. Conversely, increasing economic inequality may have influenced people's preferences with regard to residence, and consequently changed residential patterns.

The lack of attention to this possible interrelation may result from the lack of sufficiently overlapping data readily available. Due to the time consuming character of studies on residential patterns, most of these studies do not study long-term developments. The Low Countries have been chosen as a test case in this thesis, because publications of Netherlandish cities are available on both debates.

In the test case, the possible influence of changing socio-economic inequality on residential segregation has already been briefly discussed by historian Bruno Blondé. In his study of 's-Hertogenbosch, he observes that a 'tendency towards segregation' was present in the city from the beginning of the sixteenth century, and still present at the end of the century. His conclusion that increasing social-economic differences in the city did not result in increasing residential segregation may be true, but has not been conclusively proven by his research. The lack of change in residential patterns was assumed based on the observation that the richest taxpayers were found in all wards, and remained to be overrepresented in centrally located areas. [71] Chapter 6 will discuss more refined ways to compare residential patterns.

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[71] B. Blondé, *De sociale structuren en economische dynamiek van 's-Hertogenbosch 1500-1550*, Bijdragen tot de geschiedenis van het Zuiden van Nederland 74 (Tilburg 1987) 92-93.

Chapter 3

Characterization of late seventeenth century Nijmegen

In order to be able to improve the interpretation of findings in the case study of economic inequality and residential segregation in Nijmegen around 1694, this chapter provides a brief characterization of the city at the end of the seventeenth century. The city's population size, religious relations, political relations, economic development, and the threat of warfare could all have influenced residential patterns and the development of economic differences between its inhabitants.

Around 1694, Nijmegen housed around 10,000 people. The number had decreased by approximately 2,000-4,000 inhabitants in comparison to the 1680s, but increased by approximately 1,000-2,000 inhabitants with respect to the first half of the seventeenth century.[72] Nijmegen was a middle-sized city in the Dutch Republic. It had been incorporated permanently in the Dutch Republic since 1591, after years of warfare.

Appendix A provides an overview of estimated population sizes of the cities in the test case central to this thesis. The figure does not provide population sizes for these cities in the same time period as the case study of Nijmegen, but population sizes of the cities for the years they have been studied by other researchers with respect to economic inequality and residential segregation. The population size of Nijmegen is comparable to population sizes of most other cities in the test case. Amsterdam is immediately recognizable as an outlier in the Low Countries with regard to the number of inhabitants estimated. Only few cities this large existed in Europe; Amsterdam being the only one in the Low Countries. The other cities seem small in comparison to Amsterdam, but many smaller towns still were located in these regions. Gent was, in fact, one of the largest cities in Flanders. At the end of the seventeenth century, Kortrijk and Gent did not form a part of the Dutch Republic.

Nijmegen was situated in the province of Guelders, in the eastern part of the Republic. At the end of the seventeenth century, Guelders was divided into three Quarters: the Quarters of Nijmegen, Zutphen and Arnhem (the latter also being called the Quarter of Veluwe). The fourth Quarter of Roermond (or Upper Quarter) had ceased to be part of Guelders during the Dutch Revolt and had largely remained under Spanish rule after 1579. Each Quarter was self-governing to a large extent. Nijmegen was the capital city in the Quarter of Nijmegen. The city had a coordinating function for other cities and rural areas in the Quarter.

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[72] T.L.M. Engelen, *Nijmegen in de zeventiende eeuw. Sociaal-ekonomische beschrijving met aandacht voor de gevolgen van de vredesonderhandelingen 1676-1678* (Nijmegen 1978) 12; Idem, 'Leven en dood in een benauwde veste? De bevolking van Nijmegen van de zestiende tot de negentiende eeuw', in: Kuys, Bots, *Nijmegen*, 298-323, q.v. 302-305.

After 1591, Calvinism had become favoured by the city government, although many of the city's inhabitants were Catholic. Catholicism was repressed, although periods of more severe repression and periods of tolerance alternated. In 1672, allied forces of France, England, the bishop of Münster, and the archbishop of Cologne rapidly conquered the eastern and central parts of the Republic. After well over three weeks of siege, Nijmegen was captured by the French army in July 1672. People were allowed again to profess Catholicism in public, while simultaneously Protestants were allowed to practice their religion unhindered.[73] After the French left in 1674, Catholics officially lost their freedom of worship, but illegal parishes in the city were tolerated, and underground they could practice their religion virtually unhindered. This situation of relative mutual tolerance would continue until the end of the eighteenth century.[74]

These two years of French occupation costed Nijmegen and its inhabitants – and Guelders in general – a lot of money. During the occupation and years thereafter, Nijmegen had to pay high sums in order to pay off pillage, regain city property such as church bells, and free captives. This resulted in high taxes for the inhabitants and high loans on the side of the city council, which came on top of material damage to the city.[75] The levying of extraordinary taxes free captives dragged on well into the 1680s.[76]

The retreatment of the French troops from Nijmegen in 1674 did not coincide with official peace between the Republic and its enemies. Peace between the different parties was negotiated between 1676 and 1679 in Nijmegen, resulting in the so-called Treaties of Peace of Nijmegen. The presence of various diplomats and their retinue slightly strengthened the city's weakened economy, although several entrepreneurs were left with unpaid bills. Those owning notable houses profited from renting out rooms and even entire buildings. In the long term, however, the period of negotiations did neither significantly effect the city's economy, nor did it influence the living standard of its inhabitants.[77]

After the short-lived French occupation, Willem III was acknowledged as stadholder of Guelders. The stadholder regained full influence on the appellation of Nijmegen's city council and the secondary council, the *college van gemeenslieden*. From 1675 onwards, members of both councils were appointed for life. In practice, vacancies were filled by relatives of the council members. The effect was two-fold: members of the councils were loyal to the stadholder, but discontent grew among well-to-do families who were passed over. At the end of the seventeenth century, the threat of war grew

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[73] J.H.J. Geurts, 'Tussen afhankelijkheid en zelfbestuur. Nijmegen gedurende de jaren 1591-1795', in: Kuys, Bots, *Nijmegen*, 510-583, q.v. 543-544.
[74] Ibidem, 546-547.
[75] Ibidem, 544-545; P.M.M. Klep, 'De economische en sociale ontwikkeling in de Nieuwe Tijd', in: Kuys, Bots, *Nijmegen*, 324-403, q.v. 335.
[76] E. Kam, *De sociaal economische verhoudingen in Nijmegen in het rampjaar 1672 en de daarop volgende jaren*, Nijmeegse Bijdragen 8 (2010) RAN, T 107/8, 18.
[77] Geurts, 'Tussen afhankelijkheid en zelfbestuur', 549; Engelen, *Nijmegen in de zeventiende eeuw*, 27-32.

again. Nonetheless, until the sudden death of stadholder Willem III in 1702, which resulted in the Second Stadholderless Period, and the threat of the French army in the same year caused by the War of the Spanish Succession, the remainder of the seventeenth century passed by relatively peacefully for Nijmegen's inhabitants.[78]

Nijmegen's economy during the second half of the seventeenth century was characterized by stagnation. As a consequence of military activities and frequent changes in Nijmegen's political regime during the second half of the sixteenth century, Nijmegen had been cut of its hinterland, and lost its position as a centre for transit trade. After the Reduction in 1591, Nijmegen's economy modestly restored, though this restoration was often interrupted, and it would not regain its pre-war level until the mid-nineteenth century. Failing attempts of the city to attract well-to-do migrants, and a tolerant attitude towards Catholic inhabitants and people of other Protestant churches than the Reformed church, are seen as exemplifications of a week economic situation. During the seventeenth century, Nijmegen's economy became more and more dependent on the purchasing power of farmers from the surrounding countryside and rents that could be collected by the city's institutes and private parties.[79]

Located at the borders of the Dutch Republic, Nijmegen became a garrison city. Between 1635 and 1637 their number grew till around 10,000. After a period of retreatment in 1639-1650, only around 2,500 of them were left. Increasing war threat prompted a strengthening of the Dutch garrison in Nijmegen from the 1680s onwards. Until 1707, its size fluctuated between circa 3,000 and 5,000 men. These numbers must have had a tremendous influence on daily life in the city, but this has been studied limitedly so far.[80]

Engelen showed that the total number of marriages in the city was highly influenced by the size of the garrison during the seventeenth century.[81] Local entrepreneurs, especially brewers, profited from the soldiers' presence. In addition, military men paid rent for rooms and houses.[82] On the down side, garrisons are notorious for their disruption of social order.[83]

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[78] Ekkers, Ganzevles, 'De vestingwerken van Nijmegen', 290; Klep, 'De economische en sociale ontwikkeling', 337; Geurts, 'Tussen afhankelijkheid en zelfbestuur', 550-552.

[79] Klep, 'De economische en sociale ontwikkeling', 324-326, 330; Geurts, 'Tussen afhankelijkheid en zelfbestuur', 541-543; Engelen, *Nijmegen in de zeventiende eeuw*, 6, 16; J.A. Schimmel, *Burgerrecht te Nijmegen 1592-1810: geschiedenis van de verlening en burgerlijst* (Tilburg 1966) 25.

[80] Klep, 'De economische en sociale ontwikkeling', 337.

[81] Engelen, *Nijmegen in de zeventiende eeuw*, 14-15; Engelen, 'Leven en dood', 310-312.

[82] Ekkers, Ganzevles, 'De vestingwerken van Nijmegen', 290; Klep, 'De economische en sociale ontwikkeling', 336-337.

[83] J. Childs, 'Barracks and Conscription: Civil-Military Relations in Europe from 1500' *European History Online* (*EGO*), published by the Institute of European History (IEG) (Mainz 2011): http://www.ieg-ego.eu/childsj-2011-en (14 May 2017).

Hints at the economic well-being of the city at the end of the seventeenth century may be found in several sources. A modest study of wages of some *craftsmen* shows a sharp drop in their purchasing power between 1685 and 1695, followed by a modest grow until 1740.[84] Trends in the purchasing power of craftsmen, however, do not necessarily have to coincide with those of their journeymen and people in more feeble economic positions.[85] Schimmel noticed an increase in the number of new citizens without payment from the end of the sixteenth century onwards. He interprets this development as an indication of the impoverishment of the city.[86]

The case study of economic inequality and residential patterns in Nijmegen discussed in this thesis offers a picture of internal relations in 1694. Possibly, years of economic stagnation, warfare, and high taxes owing to these wars, may have impoverished Nijmegen's inhabitants. The effect of these straitened circumstances may be observed in tax registers by high numbers of people in low tax categories and many defaulters who were unable to pay. In addition, expectations are that the garrison not only left its mark on marriage patterns, as Engelen observed, but also on economic inequality levels and residential patterns in the city. The next chapters will pay special attention to these subjects in order to study how these distinctive socio-economic features of late seventeenth century Nijmegen were reflected in economic inequality levels and residential segregation.

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[84] Klep, 'De economische en sociale ontwikkeling', 385-386. It is not indicated which types of craftsmen have been studied.
[85] Klep, 'De economische en sociale ontwikkeling', 389-391.
[86] Schimmel, *Burgerrecht te Nijmegen*, 13, 16-18, 31, 38, 50.

Chapter 4

Fiscal policy and source criticism of the *Familiegeld* tax registers

The registers of a tax called *Familiegeld* ('Family Money') are the main source used to study economic inequality and residential segregation in Nijmegen in 1694. A thorough investigation of its history and characteristics are thus in order. This chapter will introduce the tax by illuminating the reasons for instalment, and its relation to the fiscal system of the Dutch Republic in general and that of the province of Guelders in particular in the first section. A thorough study of the levying of the *Familiegeld* tax in Guelders is lacking so far. The remainder of the chapter aims to reconstruct the process of tax collection in the city of Nijmegen, and extensively discusses the representativeness of the *Familiegeld* tax registers for the intended study. Next to the tax registers themselves, decisions of the city council in 1694 have been studied for this purpose.[87] Additional information may have been found in minutes of meetings of the States General of Guelders, the States General and Deputed States of the Quarter of Nijmegen. However, it would be too time consuming and too far off the subject to study these archives as part of this thesis.

In section 4.2, a reconstruction of criteria and the collection process may be found. The construction of the source will be described in more detail in the third section. In section 4.4, an in-depth study of the households exempt from paying tax clarifies the parts of society on which the tax registers provide information. By means of a case study of clergymen from three churches, the likelihood of preferential treatment for certain groups of people in the form of tax exemption will be tested. In conclusion, the accuracy of the data will be questioned by looking at imposed sums and nominal descriptions in the source.

4.1 *Familiegeld* within the fiscal system of the Republic and Guelders

The year 1672 is generally known as 'the year of disaster' for the Dutch Republic. A series of interconnected wars were waged across Europe. In 1672, former allies turned against the Republic, resulting in an invasion by French troops in 1672. The French occupation that lasted until 1674 would financially impoverish Guelders. The threat of war in Europe only ended – temporarily – with a series of treaties concluded in Nijmegen in 1678.[88]

It is precisely around this time that the levying of Familiegeld in Guelders is first mentioned in the sources. Within the same period, preparations were made to levy comparable taxes based on wealth, property and income of households and individuals in other parts of the Republic, although not all of

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[87] RAN, *OAN*, inv. no. 122: *Raadsignaten* 1694/1695.
[88] Geurts, 'Tussen afhankelijkheid en zelfbestuur', 543-549.

these taxes were immediately implemented successfully. For the city of Nijmegen, the oldest of the preserved accounts dates from 1677, but *Familiegeld* was at least levied from 1676 onwards.[89] During the seventeenth century, it was levied at least in the years 1676-1678 (in the period between the end of the French occupation and the Peace of Nijmegen), 1689-1690, and 1693-1698.

Familiegeld was one of the taxes levied in Guelders to fulfil the province's financial obligations towards the Dutch Republic. The financial policy of the States General, consisting of representatives of the Republic's provinces, primarily concerned the defence of the Republic. The estimated costs were partly passed on to the provinces, in accordance with a distribution code. In turn, the provinces could impose taxes in order to raise the money. The idea to levy equal taxes in all provinces in order to cover recurring expenses never succeeded, but comparable taxes were levied throughout the Republic. Regional differences, however, were the rule. Taxes bearing the same name could be based on different criteria and rates, whereas taxes with different names could be very much alike.[90]

Some taxes covered recurring expenses, and were imposed regularly. Non-recurring expenses and increasing expenditures, especially in times of (threatening) warfare, often resulted in extraordinary taxes. Within the Dutch Republic in general, most taxes based on wealth and property of its inhabitants were not ordinary taxes, but extraordinary taxes.[91] The same holds true for the *Familiegeld* tax levied in Nijmegen, and probably in Guelders as a whole. It is called an extraordinary tax levied to finance the conduct of war.[92]

In Guelders, decisions with regard to taxes were mainly taken at sub-regional level of the Quarters (*Kwartieren*). Each Quarter was self-governing to a large extent. The highest administrative body within a Quarter was formed by the so-called States of that Quarter, which consisted of representatives of the *Ridderschap* (nobility) and the cities. Affairs on the level of the province were discussed by representatives of the cities and *Ridderschappen* of the Quarters in question in the States of Guelders. The representatives of Guelders in the States General of the Republic also consisted of representatives of each of the three Quarters; they were called the *Gecommitteerden der Generaliteit*.

The States of the Quarter of Nijmegen formed a representative body which met a couple of times a year to discuss current affairs. Most tasks resulting from their decisions were delegated to the so-called *Gedeputeerde Staten* ('Deputed States'). The Deputed States organized, among other things, the

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[89] J.A.B.M. de Jong, *Het oud-archief der gemeente Nijmegen. Deel 1 Inventaris* (Nijmegen 1960) introduction to inv. no. 2531-2539; RAN, *OAN*, inv. no. 2531 (1677) scan 002, scan 035, inv. no. 410 scan 056.

[90] R.C.J. van Maanen, 'Hollandse vermogensheffingen in de zeventiende en achttiende eeuw', *Nederlands Archievenblad* 88-1 (1984) 61-72, q.v. 61; W. Fritschy, 'Inleiding', in: W. Fritschy et. al. (eds.), *Gewestelijke financiën ten tijde van de Republiek der Verenigde Nederlanden. Deel 1 Overijssel (1604-1795)*, RGP KS 86 (Den Haag 1996) 4-10.

[91] N.J.P.M. Bos, R.C.J. van Maanen, *Fiscale bronnen: structuur en onderzoeksmogelijkheden*, Cahiers voor Lokale en Regionale Geschiedenis 10 (Zutphen 1993) 15.

[92] RAN, *OAN*, inv. no. 122 fol. 120 (22 August 1694) fol. 137 (2 October 1694), inv. no. 2535 scan 077.

collection of taxes imposed on the level of the Quarter. Rates and conditions were determined on the level of the Quarter, but the organization of the collection of taxes was assigned to local governments. For example, Nijmegen's city council was responsible for the collection of *Familiegeld* in the city of Nijmegen and its surrounding area (*schependom*). After the taxes had been collected locally, the *ontvanger-generaal* ('collector-general') organized the collection of these sums from all parts of the Quarter. The accounts were usually sent back to the local collector in question after they had been checked.[93]

A tax bearing the same name is also known in other Quarters of Guelders from the second half of the seventeenth century up to and including the beginning of the eighteenth century.[94] Within the nearby city of Arnhem, this tax was also known as the *500ste penning* (the 500th penny). This means that 0.2% of the taxable entity will have been taxed.[95] It cannot be presumed that rates in Nijmegen would have been comparable. Even within Guelders, among the Quarters, different taxation rates and conditions could be in practice.[96]

Elsewhere in the Republic taxes based on the inhabitants' means were also imposed on the provincial level. Common names of taxes comparable to the Gueldern *Familiegeld* are *Hoofdgeld*, and taxes which names were based on property and income indicating the percentage that was levied – the umpteenth penny. Taxes imposed on households and called *Familiegeld* also existed outside Guelders. Although there were many similarities between them, these taxes should not be considered identical. They differed, for example, in the years in which they were levied and the conditions applicable, such as exempted groups.[97]

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[93] GldA, *SKN*, Inleiding, 2. Bestuur in Gelderland, 3. Historisch Overzicht, 4. Bestuursorganen, 5. Belastingheffing, Inventaris, 1.2.2.4 Andere belastingen. A thorough study of fiscal policy and practice on the level of Guelders as a whole between 1543 and 1795 is still lacking. Within the series *Gewestelijke Financiën*, which discusses the finances of the Dutch provinces, Guelders has not been included. The preserved archival sources were considered insufficient to study the fiscal situation on the provincial level of Guelders: http://resources.huygens.knaw.nl/gewestelijkefinancien (20 October 2016); Fritschy, 'Inleiding', 2.

[94] GldA, *OAA*, inv. no. 588, inv. no. 3085-3098; GldA, 0583 *Huis Laar*, inv. no. 110; GldA, 2500 *Schoutambt Rheden*, inv. no. 125.

[95] GldA, *OAA*, inv. no. 3085-3096.

[96] GldA, *SKN*, 5.1 Belastingheffing Algemeen.

[97] W.F.H. Oldewelt, 'De beroepsstructuur van de bevolking der Hollandse stemhebbende steden volgens de kohieren van de familiegelden van 1674, 1715 en 1742', *Economisch-Historisch Jaarboek* 24 (1946-1948), 80-161; Fritschy et. al. (eds.), *Gewestelijke financiën*: W. Fritschy, *Deel 1 Overijssel (1604-1795)*, RGP KS 86 (Den Haag 1996) 193-199 (*Familiehoofdgeld*: 199); L. van der Ent, W. Fritschy, *Deel 2 Drenthe (1602-1795)*, RGP KS 91 (Den Haag 1998) 207-208; L. van der Ent, V. Enthoven, *Deel 3 Groningen (1594-1795)*, RGP KS 94 (Den Haag 2001) 250-264 (*Familiegeld*: 256); R. Liesker, W. Fritschy, Deel 4 *Holland (1572-1795)*, RGP KS 100 (Den Haag 2004) 362-378 (*Familiegeld*: 375-378); S.W. Verstegen, *Deel 5 Utrecht (1579-1798)*, RGP KS 105 (Den Haag 2006) 134-135; C. Trompetter, *Deel 6 Friesland (1587-1795)*, RGP KS 106 (Den Haag 2007) 160-177 (*Familiegeld*: 166); W. Veenstra, *Deel 7 Zeeland (1573-1795)*, RGP KS 110 (Den Haag 2009) 187-195 (*Familiegeld*: 192-194). Guelders has not been included in this series.

4.2 Criteria and collection process

An ordinance about the *Familiegeld* tax of 1676 states that for people living in the Quarter of Nijmegen, the charge would be determined based on the household's 'goods, resources, income, craft, business, or other means of subsistence, including their offices and benefices'.[98] People who owned 'goods' in the Quarter of Nijmegen but who did live outside its borders had to pay 15 stiver pieces per morgen, and ten percent of the yearly income of all 'houses, tithes, mills, or other profitable goods and rights belonging to it'.[99] The tariff was thus based on each household's total income.[100] 'Goods' could also be understood as personal property, but the descriptions do not explicitly provide examples of personal property, as is often the case with property taxes. Conditions could have changed in the twenty years after this ordonnance. However, the influence of the family members' professions still becomes apparent in one of the entries in the *Familiegeld* register of 1703. Sergeants were usually not taxed, but one household did have to pay a small sum because the wife ran a small business.[101]

According to the ordonnance of 1676, taxpayers were divided in twelve tax classes, ranging from 3 to 150 guilders.[102] The ordonnance does not specify how the tax classes relate to people's actual income, other than for people living outside the Quarter of Nijmegen. This fixed rate of ten percent on total income earned in the Quarter of Nijmegen by people living outside this region, indicates that the tax was proportional in character. Possibly, low income groups experienced more difficulties raising the requested sum, which could mean that the tax had a net regressive effect over time.

The preserved tax register of 1677, and a note ordering someone to pay her tax (figure 4.1) show that people had to pay half of the sums mentioned in the ordonnance of 1676 in 1677.[103] Sums in tax registers of subsequent years show that this tax level became the norm for the *Familiegeld* tax in Nijmegen. The number of tax categories increased from twelve classes in the ordonnance of 1676 to eighty-two unique sums imposed in 1694. Judging by the large number of people who had to pay specific sums, these unique sums may still be understood as tax classes.

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[98] RAN, *OAN*, inv. no. 410 (14 June 1676): 'Ende sulcks ten respecte van een yders Goederen/ Middelen / Incompsten / handtwercken / Neringen / ofte andere middelen van subsistentie / als mede ten aensien van haere Ampten en benefitien'.

[99] Ibidem: '[...] sullen werden aengeslagen tegens 15 stuyv. per mergen / Ende soo veel huysen / thienden / molens / off andere profitable goederen en gerechticheden aenbelanght / daer van sal / als voorsz. betaelt worden het thiende part vande Jaerlyckse opkomsten'.

[100] Hamers and Engelen also assume *Familiegeld* is imposed per household in Nijmegen, but they do not refer to any sources or literature: A. Hamers, W.A.M. van Veen-Liefrink, W.J. Niessen, 'Nijmeegse kohieren van familiegeld (1703)', *Zoeklicht 2005. Genealogische heraldische bundel* (Nijmegen 2005) 151-167, q.v. 151; Engelen, *Nijmegen in de zeventiende eeuw*, 7.

[101] RAN, *OAN*, inv. no. 2560 scan 004: 'De Sergeant Erckels vrouw', inv. no. 2542 scan 019: 'Henderik Arkel Sergeant maer de vrouwe doet neringh'. They were taxed at the lowest rate possible: 1 guilder and 16 stiver pieces.

[102] RAN, *OAN*, inv. no. 410 (14 June 1676). The classes read as follows: 150, 125, 75, 50, 36, 30, 24, 18, 12, 9, 6, and 3 guilders.

[103] RAN, *OAN*, inv. no. 2531 (*Familiegeld* 1677).

Not only the distance between categories decreased, but higher tax categories were added as well. In 1677, the highest tax category was ƒ 75.00, whereas in 1694, the top three sums consisted of ƒ 100.00, ƒ 110.00 and ƒ 133.00. The lowest tax category had increased by thirty cents in 1694 in comparison to 1677 – from ƒ 1.50 to ƒ 1.80. Diversity is especially present in the twenty-seven lower categories up to and including 12.50 guilders. The largest differences occur in the nine top categories, ranging from 60 to 133 guilders. Figure B1.1 in appendix B1 visualizes these differences between tax categories. The exact number of taxpayers per category can be consulted in appendix B4.

Figure 4.1 Note ordering Miss Pelsers to pay her tax

SOURCE: RAN, *OAN*, inv. no. 2531.
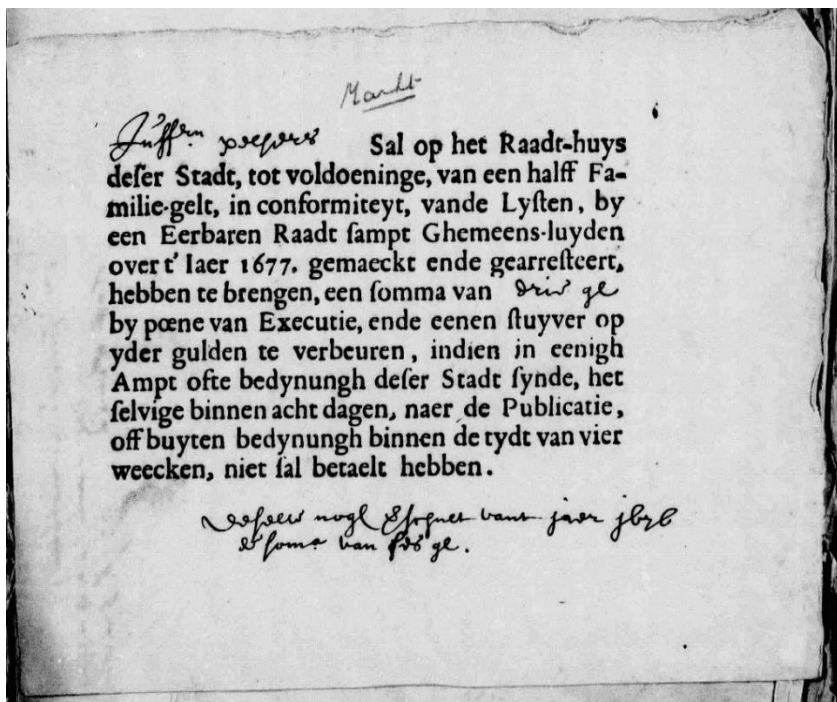
The process of classifying households started in response to a resolution on the level of the Quarter of Nijmegen. In 1694, the Quarter decided on the levying of the *Familiegeld* tax on 17 August. Nijmegen's city council ordered the establishment of a tax register barely a week later, on 22 August. Members of the city government were ordered to establish the list of taxpayers and sums for 1694 based on the list of the year before. Within a week, this list had to be checked by so-called *hopmannen*, masters of Nijmegen's wards.[104] Since 1591, Nijmegen had been divided in eight wards, or *hopmanschappen*. They were responsible for activities such as fire fighting and cleanliness of the streets within their area. It is said they were also responsible for collecting taxes, but this does not seem the case in 1694, as will be

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[104] RAN, *OAN*, inv. no. 122 fol. 120 (22 August 1694).

discussed below.[105] In other seventeenth century cities in the Dutch Republic, masters of the wards could also be responsible for collecting taxes in their part of town.[106]

The masters of the wards in Nijmegen were supposed to check the list based on their knowledge of their ward. The council's decision suggests that taxpayers were not involved in the process. The inhabitants' incomes were estimated based on experience of previous years and the ward masters' knowledge. The names within the *Familiegeld* register of 1694 indeed suggest that the person who wrote them down in principal did so without the help of the taxpayers and exempt inhabitants themselves. Especially among exempt households, descriptions such as 'a knitter' are found. If people would have had to declare their income to the tax inspector themselves, these records would have included more personal names.

People were notified of the sum they had to pay by means of a written notification.[107] Such notes were typically thrown away over time, but two of them have been preserved – one from 1677, and one from 1696 (figures 4.1 and 4.2). The ordinance of 1676 shows that people could pay in two instalments; the second half of the sum had to be paid within two weeks after the first payment. In 1677, this rule was still in practice.[108] At the end of the seventeenth century, people normally paid the entire sum at once.[109]

One could complaint against the imposed tax through the city council. Three requests for reduction were denied in October. One of these complaints definitely refers to the *Familiegeld* tax, the other two could also concern another tax levied around the same time: the *verponding*.[110] Five requests for a reduction of the *Familiegeld* tax were approved.[111] Unfortunately, the decision process of the city council remains unclear.

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[105] F. Gorissen, *Stede-atlas van Nijmegen*, Werken uitgegeven door Gelre 29 (Arnhem 1956) 49-50; H. Fransen, E. Kam, 'Nijmeegse brandbestrijding in vroeger eeuwen': http://www.noviomagus.nl/Gastredactie/Fransen/Brandbestrijding/Brandbestrijding.htm (21 July 2016).
[106] J. Hanus, *Affluence and inequality in the Low Countries. The city of 's-Hertogenbosch in the long sixteenth century, 1500-1650* (Leuven 2014) 298; P. Wagenaar, 'Delegatie onder toezicht. Financiële relaties tussen gewestelijk en lokaal bestuur tijdens de Republiek: de casus Den Haag', in: T. Pfeil et. al. (eds.), *Steden en dorpen in last. Historische aspecten van lokale belastingen en financiën*, NEHA-Series III (Zeist 1999) 59-74, q.v. 66.
[107] RAN, *OAN*, inv. no. 122 fol. 137 (2 October 1694), inv. no. 2531 (1677), inv. no. 2533 (1694) scan 051, inv. no. 2558 (1690), inv. no. 2535 (1696) scan 077.
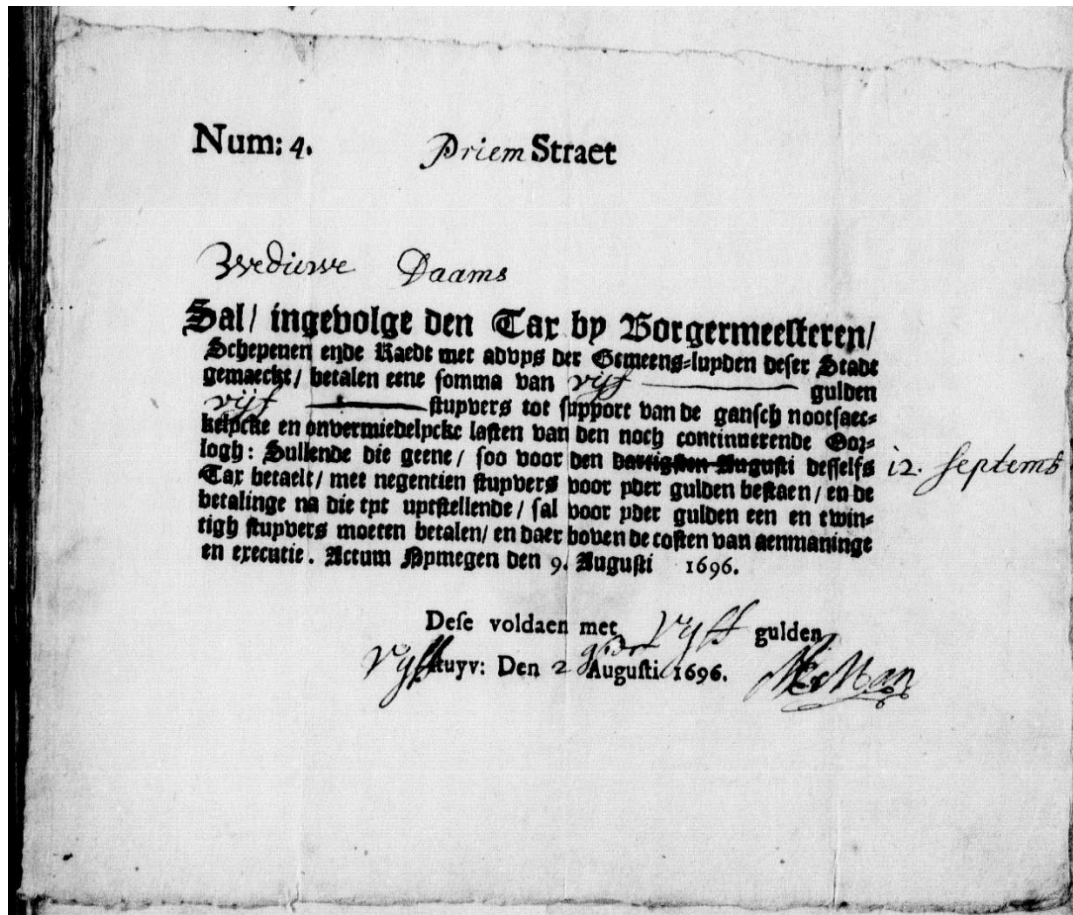[108] RAN, *OAN*, inv. no. 2531 (1677).
[109] RAN, *OAN*, inv. no. 2533 (1694) first part, inv. no. 2535 (1696) scan 077.
[110] RAN, *OAN*, inv. no. 122 fol. 142, 144-145, 150.
[111] RAN, *OAN*, inv. no. 2533 (1694) scan 027, 034, 043, 045, 084.

Figure 4.2 Note ordering Widow Daams to pay her tax, and reporting the fulfilment of this duty

SOURCE: RAN, *OAN*, inv. no. 2535.

The above-mentioned written notification in the register of 1677 indicates that a fine of 5% would be imposed when someone did not pay in time. This measure was still in effect at the end of the seventeenth century.[112] In 1694, people got a discount of approximately 5% if they paid before the beginning of November. This 5% discount is mentioned in the records, council's decisions, and the note in figure 4.2 as one stiver discount per guilder. A closer look at the data in the register reveals a more refined system, for half a stiver discount is given for parts of the imposed sum between half a guilder and a guilder. Someone who paid his due of one guilder and sixteen stiver pieces in time thus had to pay only one guilder, fourteen stiver pieces, and eight pennies. During November, one had to pay the full sum. Officially, people would be fined from the beginning of December onwards. A study of the levying of the *Ostagiepenning*, a tax levied in the 1680s to free captives taken by the French army in 1674, shows that these rates for fines and discounts were already in practice in Nijmegen during the 1680s.[113]

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[112] RAN, *OAN*, inv. no. 122 fol. 137 (2 October 1694), inv. no. 2533 (1694), inv. no. 2535 (1696) scan 077, inv. no. 2558 (1690).

[113] Kam, *De sociaal economische verhoudingen*, 19.

Between 4 December 1694 and 15 February 1695, some people indeed paid a fine of approximately 5%. However, not everyone was fined after the deadline had passed: some still paid the originally imposed sum. The latest of these non-fined payments dates from 10 June 1695. Partly, these differences in deadlines may result from different rules concerning those who held offices or jobs granted by the city government. In 1677, they had to pay earlier.[114] However, the large difference in pay dates suggests that personal circumstances and agreements may also have been of influence.

Next to this, nine people still received the 5% discount up to and including February 1695. This belated discount was approved by one of the council members. Judging by their names and titles, these people were somehow connected to the city government, and only two of them were originally taxed in the lowest category of ƒ 1.80. [115] This is particularly striking, since approximately 55% of all taxable households fell in the lowest category.[116]

On 16 December, the city council approved a letter to inform the Quarter that the requested *Familiegeld* tax had been collected.[117] However, not all inhabitants had paid their tax yet, and the city's bookkeeping was closed only after June 1695. The total sum of receipts from the city and its surrounding area was calculated after January 28, 1696. After this date, eleven more people were noted down. Nine of them paid in 1696, but the latest two being noted down in this register even date from November 1709 and January 1710. They all paid the originally imposed sum. Nine of them were charged for the smallest sum of ƒ 1.80, the other two for small sums of ƒ 2.50 and ƒ 3.00.[118] It seems likely that they had trouble raising the money. The lack of a fine should probably not be seen as a personal favour but as a strategy of the city to collect as much money as possible from those who had not succeeded to pay before the books had been closed.

According to Kam, who studied the levying of the *Ostagiepenning* in Nijmegen, people who refused to pay tax were visited by a tax collector who was accompanied by soldiers. Attachment and auction of property guaranteed the collection of the money due.[119] The notes in figure 4.1 and 4.2 suggest a similar process, threatening with execution ('executie') if payment failed to occur. However, no indications of such measurements have been found in the tax registers of 1694 or the decisions of the city council of 1694 and 1695.[120]

For circa 35% of the taxed households, no payment is recorded. Since the last inscribed payments date from 1709 and 1710, we may presume that these people did not pay at all. The high percentage

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[114] RAN, *OAN*, inv. no. 2531 (1677).
[115] RAN, *OAN*, inv. no. 2533 (1694) scan 014.
[116] Appendix B4, column E.
[117] RAN, *OAN*, inv. no. 122 fol. 167.
[118] RAN, *OAN*, inv. no. 2533 (1694) scan 021.
[119] Kam, *De sociaal economische verhoudingen*, 5-6, 19.
[120] RAN, *OAN*, inv. no. 122 (1694/1695), inv. no. 2531 (1677), inv. no. 2533 (1694).

of defaulters could mean that there were no immediate harsh consequences if one did not pay tax. More likely, however, the city council had to accept the consequences of a society in which many lived at subsistence level. Column L in appendix B4 shows that an overwhelming majority of the defaulters existed of people who already had to pay the smallest sum of *ƒ* 1.80. More than half the people within this tax category, circa 62%, did not pay their tax.

The presumption that these people did not succeed in raising the money is illustrated by the case of Matthijs Coenen. He had been appointed as commissioner of the registration of bags, packages, and other things that were sent outside Nijmegen by means of bargemen assigned to regular service. In 1694, he complained to the city council that people skirted the procedure. As a consequence, he did not make enough money to support his wife and eight children, even though he worked from early in the morning until the evening.[121] He was also granted a secondary job as one of the people involved in the ceremony around deceased fellow townsmen and -women.[122] His clearly precarious situation provides a good explanation for the lack of payment of his *ƒ* 1.80 of tax.[123]

To estimate the value of the tax sums, they may be compared to bread prices. In 1694, rye prices dropped during the year. From January up to and including December 1694, people paid between *ƒ* 0.475 and *ƒ* 0.35 for a rye bread of ten pound.[124] One pound in Nijmegen at the end of the seventeenth century equals approximately 0.47 kg in the modern metric system.[125] Less affluent families will have eaten rye bread instead of the more expensive wheat bread. The lowest tax category equalled 4-5 loafs of rye bread.

The city of Nijmegen appointed a collector to inn the tax.[126] In 1693 and 1694, this collector was Marcelis de Man. He was paid 212 guilders by the city council in 1694, slightly more than the sum of 200 guilders the year before.[127] He already took part in the collection of tax in Nijmegen at least from 1683 onwards, and continued to be involved in the beginning of the eighteenth century.[128]

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[121] RAN, *OAN*, inv. no. 331 (1694).
[122] RAN, *OAN*, inv. no. 122, fol. 41 (21 February 1694).
[123] RAN, *OAN*, inv. no. 2533 (1694) scan 082.
[124] RAN, *OAN*, inv. no. 122, fol. 17, 43, 47, 117, 144, 167-168. In the week of 17 December, an extraordinary high rye price is mentioned, which deviates from the prices in other weeks: a rye bread cost *ƒ* 0.625.
[125] W.C.H. Staring, R.W. van Wieringen *De binnen- en buitenlandsche maten, gewichten en munten van vroeger en tegenwoordig, met hunne onderlinge vergelijkingen en herleidingen, benevens vele andere, dagelijks te pas komende opgaven en berekeningen* (Arnhem 1980⁴) 91.
[126] RAN, *OAN*, inv. no. 113 (1678) fol. 340r, inv. no. 122 (1694) fol. 14, inv. no. 2533 (1694) scan 025.
[127] RAN, *OAN*, inv. no. 2533 (1694) scan 025, inv. no. 122 (1694) fol. 14. A study of the salary paid over multiple years could reveal whether this is an increasing fixed salary, or a percentage of the proceeds. In January 1695, Marcelis de Man got paid for his services with regard to the tax of 1694, and in April 1696 with regard to the tax of 1695. Both times, he got paid after the fiscal year had officially been closed.
[128] Kam, *De sociaal economische verhoudingen*, 15, 56, 59; RAN, *OAN*, inv. no. 2558 (1690), inv. no. 2532 (1689) scan 028, inv. no. 2538 (1701) scan 026.

In some cities, taxes were collected by walking from door to door.[129] In Nijmegen, the taxpayers themselves had to go the city the town hall to pay their tax.[130] The collector-bookkeeper would be present at days and hours made public beforehand. He was accompanied by one or two members of the magistrate or *college van gemeenslieden*, who probably served as inspectors. In the morning, they would be present from nine till half past eleven; in the afternoon from half past two until five o'clock. In 1694, one could pay on Tuesdays, Wednesdays and Fridays. During the last week in which one could profit from a discount, that of 3 November, payment was also possible on Thursday and Saturday. Eventually, the payments become less regular but usually still took place at these Tuesdays, Wednesdays and Fridays.[131] This process of tax collection was already in practice in the 1680s when the *Ostagiepenning* tax was levied, although different days are named.[132]

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[129] Hanus, *Affluence and inequality*, 298.

[130] This is shown by the first part of the registers, in which no pattern with regard to living place is recognizable per day, and by a preserved note in which someone was summoned to pay her tax: RAN, *OAN*, inv. no. 2531 (1677) scan 002.

[131] RAN, *OAN*, inv. no. 2558 (1690), inv. no. 122 fol. 137 (2 October 1694); First segments of the registers of *Familiegeld*. In 1694, there are even a morning and an afternoon noted down on which the collector was present but no tax payers showed up: inv. no. 2533 scan 015.

[132] Kam, *De sociaal economische verhoudingen*, 18.

4.3 Construction of the source

At the end of the seventeenth century, the registers of *Familiegeld* are divided in two parts. The first part contains notes on, for example, the rest sums of taxes of previous years, people whose sum had been reduced in the year of the register, and expenditures during the collection, such as the costs of money bags, and the redemption of interest on loans. Furthermore, it contains the registration of payments in chronological order (see figure 4.3). In general, for each date, a list of taxpayers is noted down, including whether they paid in the morning or afternoon, which men were present on behalf of the town government, the street where the tax payer in question lived (often abbreviated), the sum paid, and an identification number corresponding to the one mentioned to the person's name in de second part of the registers.

The second part is organized by ward, and within these wards by street. Each ward was named after one of its main streets. The second part of the source contains all households within the city, including those which did not have to pay anything. It looks like a pre-fabricated document in which the sums and dates of any payment are inscribed afterwards, because the space between individual entries is not dependent on what is written beneath a household in case of payment. Moreover, non-taxpaying households are also included. Comparison of the registers of 1694, 1695 and 1696 shows that wards were not always named after the same street. Furthermore, the sequence of streets within the wards alters.

In contrast to the first part, the second part contains the originally imposed sums as well as the paid ones. The imposed sum often differed from the sum people actually paid, because of discounts and fines. Notes on particular payments, such as an extraordinary reduction of the sum or payment by someone else than the one originally written down, are more elaborate in the second part than in the first. The imposed sums are written down in two columns on the right side of the page. In figure 4.4, all sums are noted down in the left column. The meaning of these columns could not be retrieved.

The *Familiegeld* tax had to be paid per household. Each entry contains one sum, and thus probably represents one household. The entry 'Jan de Post in a room' contradicts the idea that each entry represents a dwelling.[133] This entry indicates that Jan de Post occupied a room in someone else's dwelling, but was obliged to pay tax himself. For non-taxpayers, some entries describe multiple households. This phenomenon will be discussed in section 4.4 and appendix B2.

Two entries of taxpayers at first glance raise questions to the assumption that each entry represents a single household. The entries in question contain multiple persons, but in contrast to other entries indicating at 'extended families', these people have been written down on a new line each. Their

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[133] RAN, *OAN*, inv. no. 2533 scan 111. He had to pay *f* 1.80, the smallest sum, and lived in the *Ridderstraat*. It is the only reference to a room in the tax register of 1694.

names are placed between curly braces, and only one sum is imposed. In both cases, the sum was paid off at once; in both cases, the nominal descriptions indicate that they could indeed have formed one household. In one case, a man, Peter Josselet, is named together with someone else's widow, the widow of Peter van den Heuvel.[134] The other refers to three adults bearing the same family name.[135] The tax register of 1695, however, confirms the idea that these people indeed formed one household: Josselet and the widow have both been written down on one line, just like other extended families, and their sum had remained the same.[136] The family Verbolt is also recognizable as 'Friend of the city council Sir Roukens with the mother', paying the same amount of money.[137]

The registers as a whole look very neat. There are no adjustments in the second part with regard to deceased persons or moved households. One may expect this in draft registers, and such alterations can indeed be found in the registers of villages surrounding Nijmegen.[138] There are no inconsistencies in the sequence of dates suggesting a draft register of part one neither. The empty spaces and notes, sometimes crossed out or commented on later, suggest the opposite. Most likely, the sums in part one have been noted down before those in part two. Comparison of both parts reveal small writing errors in part two. Mistakes in the paid sums are retrievable, because fixed discounts on the imposed sums make clear which of the two sums is right. In this way, a minor number of ten writing errors has been identified in part two.

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[134] RAN, *OAN*, inv. no. 2533 scan 111. They had to pay ƒ 34.-.
[135] RAN, *OAN*, inv. no. 2533 scan 109. The widow of procurator Johan Roukens, Dr Willem Roukens, and Secretary Johan Roukens had to pay ƒ 20.- in total.
[136] RAN, *OAN*, inv. no. 2534, Ward of the *Smitstraet*, *Gansheuvel*, no. 80.
[137] RAN, *OAN*, inv. no. 2534, Ward of the *Mughterstraat*, *Het Valchoff*, nr. 122 'd'Heer Raadtsvrundt Roukens met de moeder'.
[138] RAN, *OAN*, inv. no. 2562-2564. For example, inv. no. 2562, scan 002.

Figure 4.3 An example of a page containing payments within the first part of the registers of 1694

SOURCE: RAN, *OAN*, inv.no. 2533 scan 015.

Figure 4.4 An example of a page from the second part of the registers of 1694

SOURCE: RAN, *OAN*, inv.no. 2533 scan 026.

4.4 Taxpayers and exempt families

The tax register of 1694 contains 1692 entries. This section wil show that these entries represent virtually all households in the city of Nijmegen in 1694, including those who were exempt from paying tax.[139] First, the completeness of the source will be discussed. Secondly, it will be invastigated which social groups can be distinguished among the group of non-taxpayers, in order to obtain a profound understanding of the taxation system and the prospects this data offers. In conclusion, by means of a case study of clergymen, the tax system of Nijmegen will be tested for preferential treatment.

4.4.1 Completeness of the source

Tax registers from early modern times often only report those obliged to pay tax. The high number of exempt households recorded in the *Familiegeld* ledger of Nijmegen supports the idea that this register offers a nearly complete record of households in Nijmegen in 1694. This hypothesis will be tested by comparing an estimate of the number of inhabitants in Nijmegen based on the tax registers to previous estimates based on other sources. A closer look at exempt households mentioned in the source in the next subsection strengthens the idea that nearly all households are present.

Some exempt entries in the tax registers of 1694 represent multiple households. Appendix B offers an estimate of the number of exempt households. Including entries referring to soldiers, the estimated number of households is 1,739-2,307. Excluding soldiers and soldiers' women, Nijmegen probably counted 1,676-1,694 households. The average household size has to be estimated as well. Based on estimates of household sizes in neighbouring areas, and previous estimates for the number of inhabitants per house in Nijmegen in the second half of the seventeenth century, an average household size of four people seems justified.[140]

Based on the tax registers of 1694, the number of inhabitants in Nijmegen, excluding military men, may be estimated at 6,704-6,776. As will be discussed below, the entries suggest that many of the soldiers lived together in houses functioning as early modern barracks. It seems plausible that the

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[139] This may not be the case for all *Familiegeld* registers preserved. Engelen already noted that the poorest, non-taxable households seem to be missing in the preserved registers of 1677, RAN, *OAN*, inv. no. 2526-2527, inv. no. 2531: Engelen, *Nijmegen in de zeventiende eeuw*, 7. As will be shown in this chapter, not all exempt households were destitute. Hamers transcribed the registers established in 1703 and 1704: RAN, *OAN*, inv. no. 2542-2545. He also assumes that only the names of taxpayers are written down: Hamers, 'Nijmeegse kohieren van familiegeld (1703)', 151. However, in all of these registers exempt households can be distinguished. E.g. Christoffel (Stoffel) Croone: RAN, *OAN*, inv. no. 2533 scan 099, inv. no. 2542 scan 024; Cornelis Merts: RAN, *OAN*, inv. no. 2533 scan 077, inv. no. 2542 scan 035, inv. no. 2545 scan 007; Aeltjen den appelcoopster: RAN, *OAN*, inv. no. 2542 scan 033, inv. no. 2545 scan 005. The cases of Cornelis and Aeltjen also show that households exempt in one year could be supposed to pay tax in another.
[140] A.M. van der Woude, 'Demografische ontwikkeling van de Noordelijke Nederlanden 1500-1800', in: M. Cloet et. al. (eds.), *Algemene geschiedenis der Nederlanden*, 5 Nieuwe Tijd (Haarlem 1980) 102-168, q.v. 158, 162; Engelen, 'Leven en dood', 303-304.

average household size of these military men was lower than the average household size among commoners, as many young soldiers were not married yet. Moreover, entries reporting 'soldiers women' suggests that soldiers wives may have lived seperated from the soldiers themselves, forming a seperate household in the source. Estimating the average military household size at 2-3, the military households accounted for 3,478-6,921 people. In total, the population size of Nijmegen in 1694 will thus have laid between 10,183 and 13,697 people.

Based on baptismal registers and a birth permillage, Engelen estimated the population size of Nijmegen around 1694 at 10,057 inhabitants. Births in military households are included in this calculation. The lower estimate based on the tax registers of 1694 approximates Engelen's estimate perfectly, which suggests that the tax registers do not underestimate Nijmegen's population size.

4.4.2 Determining groups exempt from paying tax

Multiple descriptions of people who did not have to pay tax can be found in the registers. These households were named in the ledger, but no tariffs are stated behind their names. They form 12.5% of the total number of entries in the register. The percentage of actual exempt households is even higher, since at least 15 entries can be discerned which refer to multiple houses or multiple households per dwelling. The high number of exempt households recorded in the ledger strengthens the idea that the register offers a nearly complete record of households exempt from taxation. This subsection will first discuss groups who cannot be found in the tax registers. Subsequently, this subsections aims to characterize those exempt from paying tax who are mentioned in the source.

The only people missing in the source are permanent residents living in charitable institutions, although some of the people working there can be recognized. For example, Willem Sanders is mentioned as father of the Poor Children's Home on the *Hessenberg*. The Poor Children's Home, also called the Strangers' Orphanage, was situated on the *Hessenberg*, and is indicated by number 45 on the map in appendix B3.[141] Other charitable institutions housing permanent residents within Nijmegen in 1694 were the Burgher Children's Home in the *Begijnengas* (number 42), the Old Burghers' Hospital in the *Molenstraat* (number 55), and the Madhouse in the *Pikkegas* (number 47). The tax registers of 1694 suggest that there must also have been a hospital for poor elderly people, since a master of the house of the poor is mentioned in the *Nonnenstraat*.[142] The orphans and poor people were certainly

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[141] RAN, *OAN*, inv. no. 2533 scan 066. The map in appendix B3 has been added to provide an idea of the location of these institutions. The discussion whether this map forms a factual picture for the situation in 1694 goes beyond the scope of this research.

[142] RAN, *OAN*, inv. no. 2533 scan 098. The presence of charitable instututions around 1694 has been determined based on H.D.J. van Schevichaven, *Oud-Nijmegen's kerken, kloosters, gasthuizen, stichtingen en openbare gebouwen* (Nijmegen 1909) 297-304. He does not mention an active hospital for poor people around 1694. The house mentioned in the tax registers could be a continuation of the Old Men Hospital (which also took care of women).

too poor to tax, but among the elderly burghers there might have been some better well-off. However, there are no indications in the source that their numbers were recorded. An estimate of their number is therefore impossible.

A large part of the non-taxpaying households will have been too poor to tax. Some of them are clearly distinguishable by descriptions such as 'a poor widow' and 'poor people'. Others are not literally called poor, but their poverty is suggested by the descriptions. For example, anonymous descriptions such as 'apple seller', 'knitter', and 'rag picker' indicate jobs typically performed by those at the fringes of society.[143]

In conclusion there are those called by their name, who cannot be identified as poor based on the description. We may safely assume that the majority of them should be counted among the destitute. The exact number of exempted poor households cannot be calculated, since non-taxable entries often are phrased like 'three houses with poor people' and 'poor people'. Multiple families could live within one house, so the number of households remains obscure. An attempt to estimate their number has been made in appendix B2. Excluding the undermentioned groups, their number has been estimated at 172-190 households.

Not all exempt inhabitants were too poor to pay. Titles of nobility, such as 'the lord of Bemmel' and 'the lord viscount Randwick' suggest that these people were either exempted because of juridical status (such as noble birth), or they paid their taxes elsewhere in the Quarter of Nijmegen. Table 4.1 shows the names of those who were exempted and, judging by their titles, belonged to distinguished families.

Table 4.1 Nine of the non-taxpaying households probably represented distinguished families
SOURCE: RAN, *OAN*, inv. no. 2533.
NOTE: Personal names have not been standardized; street names have been standardized according to the rules illuminated in chapter 6.2.1.

| Name	Street
D'Heer Major Benthem	Grote Burchtstraat
D'Heer van Rantwyk	Grote Burchtstraat
D'Heer major Massau	Stockumstraat
Steven van Deelen Heer tot Druijten	Hezelstraat
De Heer van Bemmel	Ganzenheuvel en Brouwerstraat
D'Heer Peter Corn: Beeckman	Grotestraat
De H*eer* Borghgraeff Randwick	Het Hof

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[143] RAN, *OAN*, inv. no. 2533 (1694) scan 075, 079, 080.

| Mevrouw Bloemendael | Ridderstraat |
| De H*eer* Frans van Lijnden H*eer* van Hemmen | St Anthonis Kerkhof |

Closer examination of the taxpayers shows that the nobility was not exempted as a rule. This can be exemplified by the Van der Lijnden family, a well-known noble family in the Quarter of Nijmegen. Lord Frans van der Linden, living in the *Ridderstraat*, had to pay ƒ 71.50, which he paid with a five percent reduction at 30 October 1694.[144] Another lord Frans van Lijnden is mentioned at the *St. Anthonis*

Figure 4.5 Castle of Hemmen, by Abraham Rademaker (1675-1735)
SOURCE: C.O.A. Schimmelpenninck van der Oije et. al. (eds.), *Adel en ridderschap in Gelderland*, 144.
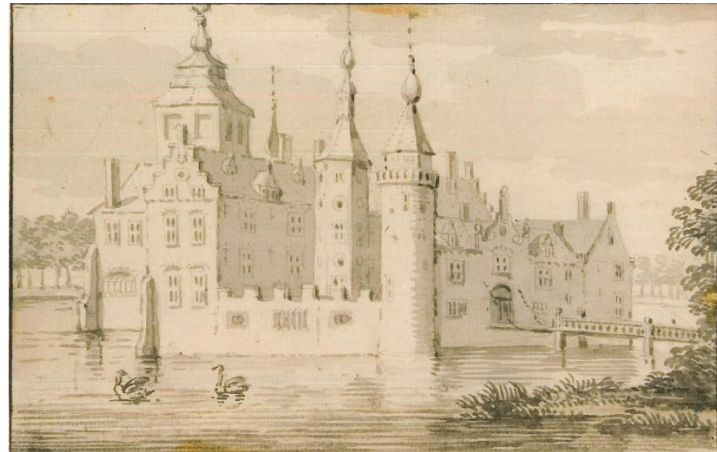
Kerckhoff ('churchyard of St Anthony').[145] He is indicated as lord of Hemmen, and exempt from paying tax. The lord of Hemmen owned the manor of Hemmen, the principle seat of the family Van Lijnden. Such manors were relatively independent administrative and judicial entities. Moreover, this lord of Hemmen was dike-warden of Over-Betuwe. This meant that he was responsible for many judicial and administrative matters within this area of Guelders. Perhaps he did own a house in the city of Nijmegen, but was liable to pay tax in the area of his main residence, Hemmen (figure 4.5). He was probably also responsible for organizing its collection within the region of Over-Betuwe.[146]

Prosopographic research may reveal whether there is a pattern in the exemption of those of noble birth. It might be the case, for example, that only those belonging to the urban nobility had to pay tax. For this study, it is sufficient to know that nine distinguished families did not pay tax. They would have been substantial tax payers if they would have been taxed.

A third group discerned among the exempt households are French refugees. After the revocation of the Edict of Nantes in 1685, many Protestants from France sought refuge in the Dutch Republic.

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[144] RAN, *OAN*, inv. no. 2533 (1694) scan 110.
[145] RAN, *OAN*, inv. no. 2533 (1694) scan 111.This second Frans van Lijnden (1628-1700), lord of Hemmen, was probably the uncle of lord Frans van der Linden (†1741) who lived in the *Ridderstraat*: http://gw.geneanet.org/gjager1?lang=en&iz=38&p=frans+karel&n=van+lynden (01 Nov 2016).
[146] E. de Jonge, M.V.T. Tenten, 'De drie kwartierlijke ridderschappen als deel van de soevereine Staten van het vorstendom Gelre en graafschap Zutphen, 1621-1795', in: C.O.A. Schimmelpenninck van der Oije et. al. (eds.), *Adel en ridderschap in Gelderland. Tien eeuwen geschiedenis*, Adelsgeschiedenis 12 (Arnhem 2013) 135-175, q.v. 143-145; G.J. Mentink, J. van Os, *Over-Betuwe. Geschiedenis van een polderland 1327-1977* (Zutphen 1985) 57-58, 201, 203; J.A.E. Kuys, *De ambtman in het kwartier van Nijmegen (ca. 1250-1543)* (Nijmegen 1987).

Governments hoped to attract the more wealthy and successful of them in order to strengthen their own economy. French refugees were often enticed into cities by means of privileges such as tax-exemption for a certain number of years. For example, in the provinces of Holland, Friesland, Groningen and Zeeland, French refugees were promised twelve years of tax-exemption.[147] In Overijssel, they were explicitly exempt from paying *hoofdgeld*, a tax imposed on every person of sixteen years or older.[148] In Nijmegen, all Calvinist refugees were offered ten years of practising their trade without the obligation of becoming a burgher or member of a guild. According to Schimmel, these attempts had only limited success. Only two new burghers, who obtained citizenship for free, can be distinguished as French refugees.[149]

The tax registers indicate that French refugees were probably also exempted from paying tax in Nijmegen. Moreover, a little more information on the size of this group is offered, although a precise calculation is not an option. Six entries of the 1694 tax registers explicitly refer to persons of French origin. None of them had to pay tax.[150] One of these entries refers to multiple French refugees, namely 'Monsieur Paris and other refugees'. Others only indicate a French origin, such as 'A French Lady', and 'Piegael, French pharmacist'. Of course, possible French refugees who are not explicitly referred to as French are more difficult to distinguish. Four additional entries of non-paying households could be found which contain typically French names, such as 'Guiliam Souille'. In appendix B2, it has been assumed that at least twelve French households lived in Nijmegen around 1694. It is impossible to determine the status of wealth of these people based on the tax registers of *Familiegeld* of 1694 only. Explicit references to refugees who had left many of their belongings behind exist, but the presence of French refugees who invested in a factory of cloth and linen in 1686 and 1698 suggests that not all of them will have been poverty-stricken.[151]

A fourth group is more clearly discernible. Soldiers and soldiers' women and children are named in the source, but never assessed. Military men of superior ranks were not always exempt. All discernible sergeants were not assessed, but there are examples of captains and lieutenants being exempt while others paid tax. A notification for the above mentioned tax per person in Overijssel states that soldiers, in contrast to their officers, were exempt from paying tax.[152] A similar rule seems to have been applied to the garrison in Nijmegen.

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[147] J.H. Maronier, *Geschiedenis van het protestantisme. Van den Munsterschen vrede tot de Fransche revolutie 1648-1789* (Leiden 1897) 142.

[148] Fritschy, *Gewestelijke financiën, Overijssel*, 193.

[149] Schimmel, *Burgerrecht te* Nijmegen, 61-62.

[150] RAN, *OAN*, inv. no. 2533 (1694) scan 30, 66, 86, 89, 103, 104.

[151] Van Schevichaven, *Oud-Nijmegen's kerken*, 49-51, 378-379; Schimmel, *Burgerrecht te Nijmegen*, 62.

[152] Fritschy, *Gewestelijke financiën, Overijssel*, 193.

Just like the number of poorest households and French refugees, the exact number of military households cannot be calculated. A description such as 'two houses of soldiers' is the rule rather than the exception. The size of the garrison around this time is estimated at 3,000-5,000 men.[153] The eleven houses of soldiers (listed within four entries) and two additional soldiers, one cavalryman, and fourteen men of higher rank within the tax registers probably do not represent all of those men. This relatively low number of houses can be explained by the habit to partly billet the garrison on civilians.[154] These men will not have been named in the tax registers. In addition, married soldiers may have been registered by their name, which makes them indistinguishable unless taxpayers would be compared to marriage registers.

Next to entries concerning the military men themselves, there are entries referring to their women and children. Seven entries mention women and children of soldiers. Four of these entries represent multiple women. Eight additional entries represent wives and widows of military men of higher rank, of which one entry represents two officers' wives. Soldiers' wives and children were often left behind if the men were replaced. The Poor Children's House was established in 1638 in response to the high number of abandoned and orphaned soldiers' children.[155] In total, 12.4% of the total number of entries representing exempt households is formed by military related entries. In appendix B2, the total number of households related to the military in Nijmegen, based on these entries in the tax registers, has been estimated at 219-824.

4.4.3 Testing for preferential treatment

Next to permanent residents in charitable institutions, four groups exempt from paying tax have been distinguished so far: the destitute, some specific noblemen, French refugees, and military men of lower rank. The question remains whether specific groups or individuals were given preferential treatment. Clergymen form a good case to study to what extent personal favours may have influenced taxation. Most clergymen households were charged; none of them had to pay the lowest sum of one guilder and sixteen stiver pieces. Three exempt households can be distinguished as clergymen and their wives or clergymen widows. Religious discrimination was very common, so it is possible that discrimination would be found among this group. Moreover, clergymen are clearly discernible by means of their title, and their names are preserved in other sources because of their prominent position within society. Names of clergymen of three churches discussed in literature have been compared to the tax register of 1694: those of the Lutheran congregation, the Reformed church and the Walloon Church.

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[153] Klep, 'De economische en sociale ontwikkeling', 337.
[154] Ibidem, 336.
[155] Van Schevichaven, *Oud-Nijmegen's kerken*, 389-391.

The Lutheran congregation was one of the less prosperous protestant communions within Nijmegen. Their presence had officially been permitted since 1670. Both pastor Middeldorf (pastor in Nijmegen between 1694 and 1696) and his successor pastor Dietzel (1696-1710) eventually left Nijmegen because the community could not offer them sufficient resources. Especially after the purchase and rebuilding of the church and parsonage, the parish's financial situation had become precarious. For example, in 1693, they were not capable of paying the usual sum to support the widow of their recently deceased pastor Le Bleu.[156] His successor, pastor Middeldorf, was able to pay a tax of five guilders in 1694. He paid in time with five percent off. Appendix B4 shows that he belonged to the top 28% taxpayers. This probably indicates the deplorable economic situation within Nijmegen rather than prosperous living conditions of the pastor's family: approximately 55% of the taxpayers were assigned to the lowest tax category of ƒ 1.80. The widow of pastor Wisman (1674-1689), one of Middeldorf's predecessors, did not have to pay tax. She was probably too poor to be taxed. The precarious position of clergymen's widows was a point of discussion in many protestant churches in the seventeenth century Dutch Republic.[157]

Not all widows of clergymen in Nijmegen were destitute, though. The widow of Petrus de Vrij, one of the pastors of the Reformed church between 1662 and 1678, had to pay twelve guilders. She paid in time with five percent off. The Reformed church was the branch of Protestantism favoured by the government. The fact that a pastor's widow of this church had a higher income than the pastor of the Lutheran congregation seems telling, although more profound research to their circumstances of life, such as the presence of family members, is necessary to provide the proper context for the imposed sum.

Pastor Splinterus à Pothuijsen (1682-1702) also paid less tax than the widow of Petrus de Vrij. He paid 95% of the imposed sum of ƒ 8.75. Of all four Reformed clergymen within 1694, he paid by far the smallest sum. Jacobus Wilting (1670-1695) was supposed to pay ƒ 18.-, and pastors Engelbert Beekman (1656-1708) and Johannes Smetius (1679-1704) each had to pay ƒ 71.60. They all paid in time with five percent off. The sum of ƒ 71.60 guilders is the largest sum recognizable among the clergymen households. The Reformed clergymen thus indeed seem to have been the most prosperous. They even belonged to the top 2% of taxpayers. None of the active Reformed clergymen were exempt from paying tax. There is every indication that they were not favoured over others when it came to paying taxes.

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[156] K.G. van Manen, *Verboden en getolereerd. Een onderzoek naar lutheranen, lutheranisme en lutherse gemeentevorming in Gelderland ten tijde van de Republiek,* Werken Gelre 55 (Hilversum 2001) 168-170; Van Schevichaven, *Oud-Nijmegen's kerken*, 229-234, 238.

[157] A. Schmidt, '"Dat oock de weduwen ende weesen der dienaren niet vergethen werden" De ontwikkeling van de zorg voor predikantsweduwen in Leiden in de 17de eeuw', *Leids Jaarboekje voor geschiedenis en oudheidkunde van Leiden en omstreken* (2000) 39-53.

The Walloon church was also closely connected to the city council. Its clergymen, readers and synod were funded by the city. Moreover, the magistrate could influence the appointment of the pastors and deacons. In 1694, two people preached in this church: Zacharias Polgé (between 1683 and 1701), and Isaac Ponce (1685-1721).[158] Polgé had to pay four guilders in 1694, whereas his colleague Ponce was not charged anything. These sums are probably not accurate reflections of their economic welfare or relation to the magistrate, since both men were French refugees. As such, they had been promised freedom of impost. Polgé had been called to Nijmegen in 1683. He was offered a stipend of 500 guilders, free housing, and freedom of impost and excises. In addition, he was granted a once-only grant of 100 guilders in order to purchase furniture and books, because he had been forced to leave many of his belongings behind. Ponce had been his adjunct pastor since 1686. In 1701, he received 200 guilders from the city and 100 from the Quarter of Nijmegen, and he is known to have been exempt from paying impost.[159] Ponce was thus exempt from paying tax in 1694 because of his status as a refugee. In this case, the fact that pastor Polgé did pay tax is more surprising. Usually, a maximum number of years of tax-exemption for French refugees was agreed upon.[160] For Polgé, this period may have been passed in 1694.

The test case of these clergymen from three churches leads to the conclusion that there are no indications that clergymen of any denomination were shown preferential treatment with regard to the imposed sums.

4.5 Accuracy of imposed sums

One may question the extent to which imposed sums reflect the actual living conditions of the taxpayers if so many of them were not able to raise the requested money. Column M in appendix B5 shows that almost 62% of the households in the lowest tax class should probably indeed be considered poorer than they were estimated. The other part of this group, however, almost entirely succeeded in paying without a fine. Comparison to other years might reveal whether the income of the people in this category was structurally overestimated. Other defaults of payment occur in the bottom 24 tax categories, up to and including the group which had to pay ten guilders.

Adjustments to the imposed sums show that they were not rigidly imposed. Instead, personal circumstances could be taken into account when people were unable to pay. For five persons, the sum to be paid was lowered by decision of the city council. They all fell in the twenty lowest categories, up to and including *f* 7.50. Furthermore, every year, multiple sums were adjusted in comparison to the

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[158] Van Schevichaven, *Oud-Nijmegen's kerken*, 382-383.
[159] Van Schevichaven, *Oud-Nijmegen's kerken*, 378-379; G. Onder de Linden, *Maandelyke uittreksels of boekzaal der geleerde waerelt. January 1739* (Amsterdam 1739) 346-348.
[160] Maronier, *Geschiedenis van het protestantisme*, 142.

year before. With regard to the registers of 1694, the city council ordered a revision of the list of 1693.[161] This practice is also recognizable in a list of proposed corrections regarding the imposed sums dating from around 1702.[162]

In 1694, the city may be considered experienced in levying this tax, since it had also been imposed several times in the years before. The increase in the number of tax categories suggests an increase in accuracy of imposed sums over the years. Moreover, the high number of tax categories in 1694, and the existence of categories in which only a single household is named, is indicative of a refined tax system. The reliability of the data is also proven by the small case study of clergymen, which indicated that no one was personally favoured or spared beforehand except from residents of charitable institutions, the destitute, military men of lower rank, French refugees, and specific noblemen.

Hanus has noted that the entire population of sixteenth century 's-Hertogenbosch was taxed if fiscal orders came from the central government. If the initiative originated from the city council, a more lenient attitude towards the city's poor was adopted.[163] In the case of the registers of *Familiegeld* in Nijmegen, fiscal orders came from the Quarter of Nijmegen in order to produce a sum requested by the central government. It is possible that Nijmegen's city government may also have tried to include as many people as possible to bring in such sums. This would explain the high number of relatively poor people, of whom many seem to have been unable to pay.

Two more comments should be made with regard to the accuracy of the imposed sums. Firstly, three households in high tax classes attract attention.[164] All three refer to a house containing multiple residents. They are part of the four highest tax categories, which contain in total only five households. The 'residents of the house of the lord of Walbeecq' lived in the *Houtstraat*, the 'residents of the castle of Orange' in the *Jodengas*, and 'Miss van Zeller and the other residents of the house' in the *Hezelstraat*. Most likely, these entries refer to distinguished households including their staff. Living in staff may be included in the sum paid by these households. If this is the case, people should in reality be added to several lower tax categories.

Secondly, households may seem poorer than they actually were if one or several of the breadwinners within the household were excluded in the calculation of taxable income. This could, for example, be a problem with regard to military households. Military men could have a wife with a taxable income. Expectations are that such women are discernible by descriptions such as 'the wife of sergeant Erkel'. There is no sign that such women are included in the register of 1694.

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[161] RAN, *OAN*, inv. no. 122 fol. 120 (22 August 1694).
[162] RAN, *OAN*, inv. no. 2560.
[163] Hanus, *Affluence and inequality*, 302.
[164] RAN, *OAN*, inv. no. 2533 (1694) scan 057, 059, 061.

There is, however, a minor number of taxpaying households representing wives of men who do not seem to have passed away.[165] That is, they are not indicated as widows, but, for instance, as 'Derck de Smit's wife'. If their men were exempted from paying tax, the contributions in question may not be representative for the income of the entire household. Within the tax registers, however, there are no references with regard to profession or origin to suggest that these men were indeed exempted. Possibly, these wives were the main contact or bread winner of the household because their men were usually not at home, the husbands might have been injured or ill, or temporarily without a job.

Children form another group of possible breadwinners in households. They were often exempt from paying tax until a certain age.[166] It is not known whether this was the case in Nijmegen in 1694, and if so, how much they may have contributed. However, if they were indeed exempted, this was probably done because they did not contribute significantly to their household's taxable income. For the *hoofdgeld* tax in Nijmegen of 1675, inhabitants over fifteen were taxable.[167] Possibly, this age was also applicable with regard to the *Familiegeld* tax. Children are occasionally named in the tax registers, but their age remains unclear. Possibly, those indicated as sons and daughters of others are adults who were only identified by their parents, or who were still living in their parents' household.

4.6 Accuracy of the nominal descriptions

As discussed above, most likely, people did not give their own name to the composer of the tax register, but were inscribed by those responsible for the collection of the tax. This section discusses the interpretation of these descriptions, and the extent to which these people are identifiable in other sources.

In principle, every household permanently residing in the city was recorded. It is likely that individuals named in the tax register were considered head of household. Sometimes, additional members of the household are reported. They were often referred to by a description of their relation to the head of household, such as mother (in law), sister (in law) or son (of a previous marriage). Possibly, such people were explicitly added when they could have been part of different households but lived together instead.

Within his study of sixteenth and seventeenth century 's-Hertogenbosch, Hanus argues for a distinction between sources produced for short-term purposes, and those produced for long-term purposes. Short-term purposes ultimately concern sources such as tax registers which were established in order to collect the tax properly. They are only supposed to guarantee identification of

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[165] RAN, *OAN*, inv. no. 2533 (1694) scan 039, 046, 047, 056, 066, 073, 112.
[166] Fritschy, *Gewestelijke financiën, Overijssel*, 194; Trompetter, *Gewestelijke financiën, Friesland,* 164.
[167] Engelen, *Nijmegen in de zeventiende eeuw*, 7-8.

people by the current tax officers and clerks, but no longer served a purpose once the collection procedure had been completed. They were typically insufficient to identify people several years later, especially when the tax officers and clerks had been altered. Based on several sources within the archives of 's-Hertogenbosch, Hanus supposes that data meant for long term identification is more likely to have been established by means of a clear methodology. That means that every household would be described by the same variables, meaning for instance that profession would not be noted down incidentally, but either structurally or not at all.[168]

The *Familiegeld* registers of Nijmegen bear a resemblance to the fiscal registers discussed by Hanus, which he assumes are established for short-term identification. At first sight, this also seems likely for the case of Nijmegen, where the books of the tax of 1694 were officially closed in January 1696. However, the inscription of payments up to and including 1710 contradicts the idea of short-term identification only. The books were closed, but circa 35% of the taxed households never actually paid. Analysis of payment-rates and dates in other years could reveal whether such high rates of defaults were common. If so, we should consider that the clerk most likely anticipated the possibility that he or his predecessor would need to identify these residents several years later.

The note in figure 4.2 shows that the serial numbers written down to each taxpayer in the register (see figure 4.4) are also mentioned on the requests for payment. Together with the street where the taxpayer lived, this number offered tax collectors the possibility to identify taxpayers years after a tax had actually been imposed. Shifts in identification numbers over the years indicate that these numbers should not be understood as fixed house numbers or numbers assigned to a certain household. Even if identification numbers changed over the years, a tax collector unfamiliar with the household in question could, if necessary, easily retrieve their living place by means of the street mentioned and names of other people in the same street. Note 4.1 shows that tax debts of previous years could be mentioned on a request for payment, so tax collectors possibly kept an eye on previous years as well.

Although the data is structured by ward, street and identification number, the descriptions of residents do not conform to a uniform system. A description of a household may contain a form of address (such as Miss or Doctor), a first name, patronymic, family name, a nickname, for instance referring to physical characteristics, or a reference to a profession, religion or geographical origin. Not all of these aspects are mentioned in every entry, however, nor are the elements in the entry specified. Comparisons to other years or other sources may complete the information on gender, composition of the households, occupation, and other variables, but these inconsistencies complicate the interpretation of the information mentioned.

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[168] Hanus, *Affluence and inequality*, 307-308.

For example, it is difficult to distinguish between patronymics (names referring to the father of the person in question) and family names (which remained the same over generations). By the end of the seventeenth century, family names had become normalized in Europe, including the Low Countries.[169] In late seventeenth century Nijmegen, however, patronymics were still in use next to hereditary family names.[170] When linking individuals from Nijmegen in different sources to one another nominally, both interpretations of the names should be taken into account.

A similar problem occurs with regard to the family names and references to occupations and geographical origin. Sometimes, such descriptions referred to the individual's origin or current profession, but in other cases, they referred to those of their parents or other ancestors. Peter van Loon (Peter of Loon), for example, did indicate to originate from Deurne in the *meierij* of 's-Hertogenbosch.[171] There are several places within this region which can be referred to by 'Loon', but the fact that he indicated to come from Deurne makes it unclear whether he ever actually lived in 'Loon'.

When a name actually referred to an occupation of the taxpayer, it should be taken into account that a lot of people could have multiple jobs, could change their main job or could obtain a different function, and that they could be identified most with one of their occupations. Two people called Derck van Trist were specified by 'shipmaster' and 'shoemaker' respectively.[172] These additions certainly refer to their occupation. Mayor Kuijper ('cooper'), however, probably did not produce barrels for a living. He lived in the *Ridderstraat* and was supposed to pay *f* 71.60.[173] For people like Derck Smith, Joost Smith, and Leonard Smith, additional information is desirable in order to determine their occupation.[174] Jacob Wessels, living in the *Muchterstraat*, was indicated as a bricklayer's servant in 1694, but may have been promoted eventually.[175]

Differences in the way people are described can be explained by real factors as well as cultural ones. Based on the case of early sixteenth century 's-Hertogenbosch, Blondé statistically proved that people are more likely to be identified by surname rather than profession the higher their position on the fiscal scale.[176] A real factor explaining this pattern are differences between typical sources of income of households in the bottom brackets and broad top end. People in the broad top end were more likely to obtain the majority of their income out of property revenues. It was therefore often not applicable to name an occupation in the proper sense. The tax registers of Nijmegen show that these households

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[169] Hanus, *Affluence and inequality*, 312.
[170] RAN, *OAN*, inv. no. 122 fol. 84 (9 May 1694).
[171] Schimmel, *Burgerrecht te Nijmegen*, id.nr. 3085; RAN, *OAN*, inv. no. 2533 (1694) scan 081.
[172] RAN, *OAN*, inv. no. 2533 (1694) scan 052.
[173] RAN, *OAN*, inv. no. 2533 (1694) scan 110. He paid in time with 5% off.
[174] RAN, *OAN*, inv. no. 2533 (1694) scan 053, 058.
[175] RAN, *OAN*, inv. no. 2533 (1694) scan 104.
[176] Blondé, *De sociale structuren*, 39-45.

are often characterized by a form of address referring to functions such as a position in the city's magistrate.

In addition, cultural factors have resulted in underrepresentation of professional references in the upper layers. Wealthy households were more likely to be known by other inhabitants because of their political, social and economic influence within the city. As a consequence, they were more often identified by family names. Next to this, family names were typically frozen earlier among distinguished families than among the poorer ones.[177]

Although professional indications are more likely to occur in the bottom brackets than in the broad top end of society, most professions are still underrepresented even in this part of society. People often did not have a single occupation, or were out of work at the time of the levy.[178] In Nijmegen, this is illustrated by the earlier mentioned Matthijs Coenen. He had been appointed commissioner of the registration of bags, packages, and other sorts of mail by the city council, but he also tried to obtain additional jobs in order to make ends meet. He did have multiple sources of income, but none of them was recorded in the tax registers.

The descriptions of some forms of address are expected to be more representative. For the earlier discussed clergymen, for example, it is very likely that all of them will have been indicated as such. For widows, on the other hand, it cannot be guaranteed that all of them are named as such in the tax registers. However, a study on widows who were considered head of household based on these tax registers may well provide an indication of the living conditions of this social group in early modern Nijmegen.

The difficulties discussed here do not mean that nominal information in the tax registers is useless, but rather that each year should be considered a snapshot of the way tax collectors identified Nijmegen's inhabitants. Descriptions may slightly alter over the years, which offers additional information on households as well as insight in changes over time. Especially after comparison to other types of sources, the fiscal registers offer valuable insight into early modern Nijmegen. The tax registers discussed here are well suited to be compared to other sources. In addition to a nominal description, additional information is available on living place in the city, and an indication of economic means is given by means of the amount of tax they were supposed to pay. Of course, it is not possible to link all people to other sources. Especially the group of households exempted from paying tax contain descriptions which are too vague. Furthermore, people bearing very common names, such as Hendrik

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[177] Hanus, *Affluence and inequality*, 309, 311; Blondé, *De sociale structuren*, 40.
[178] B. van de Putte, E. Buys, 'Occupational titles? Hard to eat, easy to catch', *Belgisch Tijdschrift voor Nieuwste Geschiedenis* 40-4 (2010) 7-31, q.v. 9-13; Hanus, *Affluence and inequality*, 311; Blondé, *De sociale structuren*, 40.

Peters, may be difficult to identify without sufficient additional information.[179] Apart from these facets, the registers of *Familiegeld* form an excellent starting point for a study of early modern Nijmegen.

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[179] RAN, *OAN*, inv. no. 2533 (1694) scan 055, 056, 082. Two of them even lived in the same alley.

Chapter 5

Economic inequality

This chapter will first discuss previous findings with regard to economic inequality in late seventeenth-century Nijmegen. The second section debates types of sources used to measure economic inequality, and the advantages and drawbacks of an often used inequality index: the Gini coefficient. Section three examines income inequality in Nijmegen around 1694. After a discussion of the *Familiegeld* tax registers as a source to study income inequality, inequality levels in Nijmegen around 1694 will be discussed and compared to the situation in other early modern Netherlandish cities. In conclusion, these results will be discussed with regard to the question how economic inequality may be studied in relation to residential segregation in early modern cities.

5.1 State of affairs: inequality in Nijmegen around 1694

Economic inequality in late seventeenth century Nijmegen was significantly influenced by religion. The largest group of inhabitants discriminated because of their faith were Catholics. Since 1591, Calvinism had been the official religion in Nijmegen, even though Catholics accounted for a majority of the population. During most of the seventeenth century, Catholics were not allowed to buy citizen rights, nor to be a member of one of the guilds or fraternities. Although some of them succeeded in getting round these rules, there are indications that socioeconomic inequality between Catholics and Protestants grew during the seventeenth and eighteenth century.[180]

Nijmegen also discriminated its Jewish population. They too were usually denied citizenship, and could not become a member of guilds and fraternities. Moreover, Jews were only allowed to trade in particular goods, and they paid four times as much as Christians for a counter in the butcher's hall. These rules stimulated economic backwardness of the Jewish population. Not all Jewish families belonged to the bottom layers of society, though. The Jewish families who leased the city's pawnshop, for instance, typically belonged to the group of wealthy Jews.[181]

It is hard to obtain quantitative information on the economic situation of such groups, since they are hard to identify in the sources. Sources suitable to study economic inequality do not structurally refer to religious confession. Moreover, there are no registers to compare to this data. Although the city council of Nijmegen was comparatively tolerant towards other confessions in the second half of the seventeenth century, in particular Catholics had to practice their religion underground.[182]

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[180] Klep, 'De economische en sociale ontwikkeling', 391-392, 402.

[181] Ibidem, 393-395; H.D. van den Berg, *Onse Joeden. Nijmegen en de geschiedenis van haar Joden* (Zutphen 2002) 70-72, 75-79, 116.

[182] Geurts, 'Tussen afhankelijkheid en zelfbestuur', 529-531.

Quantitative information on economic differences between Nijmegen's inhabitants are mainly available for those who were paid by the city. For instance, the city steward paid council members and city servants, such as couriers. Next to this, wages were paid to those occupied in building, repair, and maintenance projects, such as repairs to the harbour, and refuse collection. Quantitative studies of living standards and economic inequality in late seventeenth century Nijmegen have therefore been based on wages of craftsmen paid by the city.

These wages are considered most suitable to provide an indication of the living standard within the city for several reasons. Firstly, the tasks of the craftsmen are clearly described, and all people within the same occupational group received the same wages. Wages were thus not determined personally, but typically for the entire occupational group in question. Secondly, craftsmen were paid per day, which left little time for side-lines. Consequently, the wages in question probably made up the majority of the craftsman's income. Thirdly, wages were dependent on the number of working hours, since wages during the winter were lower than those paid between mid-February and November. Studies regarding economic inequality in Nijmegen take as a starting point that wages paid by the city to these craftsmen are representative for the level of wages within the city as a whole.[183]

Engelen has studied wages of craftsmen in Nijmegen between 1670 and 1684. He found that master bricklayers and master slaters received the same salary. These masters earned 1.3 times as much as the common bricklayers and slaters, and twice as much as workers. Master bricklayers earned 1.7 times as much as their hodmen (bricklayers' assistants).[184] Based on the development of rye prices, Engelen sketched the evolution of the craftsmen's purchasing power. Based on his data, it can be calculated that, in comparison to the latter decade of the sixteenth century, the purchasing power of these wage earners grew approximately 45 % for the masters and circa 15 % for their subordinates. The difference in purchasing power between masters and their hodmen and workers doubled. Moreover, the purchasing power of masters exceeded that of their bricklayers and slaters even by a factor of circa 6 and 14 respectively.[185]

Although these calculations ignore the fact that the spending pattern of masters probably differed from that of unskilled workers, it indicates an increasing economic inequality between masters and their subordinates in the seventeenth century. According to Klep, wages of master craftsmen were forced to rise during the seventeenth century, even though Nijmegen's economy stagnated. If this

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[183] Engelen, *Nijmegen in de zeventiende eeuw*, 22. Blondé and Hanus have shown more recently that one should be careful to consider real wages of building craftsmen representative for the urban populace as a whole: B. Blondé, J. Hanus, 'Beyond building craftsmen. Economic growth and living standards in the sixteenth-century Low Countries: the case of 's-Hertogenbosch (1500-1560)', *European Review of Economic History* 14-2 (2010) 179-207.
[184] Engelen, *Nijmegen in de zeventiende eeuw*, 23.
[185] Ibidem, 23-26.

would not have been done, Nijmegen would have lost its skilled workers to more prosperous cities with higher wages. Especially cities in Holland held great attraction.[186]

In the last two decades of the seventeenth century, identical to the development in Holland, the level of wages of Nijmegen's master craftsmen stagnated. Linkage of their daily wages to grain prices indicates a drop in purchasing power of Nijmegen's master craftsmen during this period. As a consequence of Nijmegen's stagnating economy, the upper and middle class probably shrank during the seventeenth century, whereas the working class further impoverished. Simultaneously, the fortune of people owning real estate grew, which resulted in increasing economic inequality within the city. This process continued during the eighteenth century.[187]

Investigations into economic inequality in seventeenth century Nijmegen so far thus focussed on wage levels. This provides us with information on economic differences between very specific groups. This information can be put into perspective by providing a general measure for economic inequality in Nijmegen.

5.2 Methodology and sources for measuring economic inequality

5.2.1 The Gini coefficient: a measure for economic inequality

A general indication of economic inequality within late seventeenth century Nijmegen can be provided by calculating a Gini coefficient.[188] The Gini coefficient is the most often used index to indicate income and wealth inequality in past and present societies. It offers a value between zero and one. An imaginary, optimal unequal society in which one person earns all is represented by one, whereas a society in which all people would earn the same would have a Gini coefficient of zero. The possibility to compare Gini coefficients of different societies with one another is the prime reason for using this coefficient as an indication of economic inequality within this study. The index is not dependent on the scale of income and the population sizes of the societies in question.

The distribution of, in this case, tax payment based on the inhabitants' income can be graphically expressed by a Lorenz curve. On the x-axis, the cumulative share of households is plotted from low to high. On the y-axis, the cumulative share of imposed tax is plotted in ascending order. This means that a point within the graph marks the cumulative percentage of the total number of households (x coordinate) which has been taxed a certain percentage of the total amount of imposed tax (y

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[186] Klep, 'De economische en sociale ontwikkeling', 385-386, 389-391; J. de Vries, 'Regional economic inequality in the Netherlands since 1600', in: P. Bairoch, M. Lévy-Leboyer, *Disparities in Economic Development since the Industrial Revolution* (London 1981) 189-198, q.v. 190.
[187] Ibidem, 385-386.
[188] This paragraph has mainly been based on F.A. Cowell, *Measuring inequality* (Oxford 2011) 21-22, 26-27, 64-66, 74, 164-165; L. Soltow, J.L. van Zanden, *Income and wealth inequality in the Netherlands 16th-20th century* (Amsterdam 1998) 9-16.

coordinate). For example, figure 5.1 shows that in Nijmegen anno 1694, approximately the bottom 55% was supposed to produce around 15% of the total amount of tax.

A perfectly equal society is represented by the line y = x, the so-called line of equality. The Lorenz curve for the ultimate unequal society would run along the x-axis with the exception of an optimal peak at (x,y) = (100%,100%). The Gini coefficient is defined as the ratio of the area between the Lorenz curve and the line of equality over the area between the line of perfect equality and the line of perfect inequality. The latter area always equals 0.5, since the axes scale from 0 to 1. The Gini coefficient can thus be calculated as twice the area between the Lorenz curve and the line of equality. This equals zero if the Lorenz curve equals the line of equality, in which case everyone pays the same amount of tax.

The Gini coefficient (G) can also be calculated without first drawing a Lorenz curve. It is defined as follows:

$$G = \frac{\Delta}{2\bar{x}}, \text{ where } \Delta = \sum_{i,j}^{N} |X_i - X_j| / N^2$$

Within this formula, $\bar{x}$ is the mean. Delta is the mean difference, the average difference in paid tax between two randomly chosen persons from the population. For a source containing N tax classes, the total sum of the differences between any tax classes X_i and X_j should be divided by N^2 to obtain delta.

A downside of using the Gini coefficient to study inequality developments over time, is the difficulty of pointing to the segment of society which changed the index in particular. This drawback can be overcome by complementing the analysis by comparing the shares of tax paid by particular percentiles. Most often decile shares are studied in this respective. Although this thesis does not intend to study changes over time, such an analysis will be performed to obtain data which is optimally comparable to other datasets in the future.

Related to this problem, one should note that the Gini coefficient is not a sound measure if one aims to compare developments regarding inequality within subgroups of a society to inequality developments in society as a whole. For this research, it means that a Gini coefficient may be calculated for Nijmegen as a whole, which can be compared to the Gini indices of other early modern cities. The development in inequality in the city of Nijmegen may also be studied by calculating and comparing Gini indices for Nijmegen over time. Next to this, one may calculate Gini coefficients for Nijmegen's sub societies, such as all individual wards and streets. The inequality indices of, for instance, these streets may be compared among one another. Developments in economic inequality within such a subgroup may be measured over time by comparing the Gini index of a particular street with the same

street in other years. One should be careful, however, not to jump to conclusions with regard to the development of inequality in the city as a whole by studying developments in inequality in the city's subgroups. The different sizes of subgroups influence the calculated Gini coefficients.

5.2.2 Fiscal sources for measuring economic inequality

Fiscal data forms one of the main source types used for measuring economic inequality. Problematic in the study of economic inequality, particularly for pre-modern societies, is the scarcity of long-term uniform data for different regions, and the representativeness of available data for society as a whole. This subsection will discuss different types of fiscal sources used in the debate on the development and determinants of economic inequality to provide background information for a comparison of studies of different cities.

Fiscal sources used to reconstruct economic inequality distributions for societies generally represent wealth distributions or approach total income distributions. Piketty carefully distinguishes between two ways to obtain income: from wealth and from labour. He considers total income to be a sum of these two components. Based on data from the twentieth and twenty-first century, he observed that inequality with respect to wealth is always greater than inequality with respect to income from labour.[189] He also noted that the level of inequality of total income falls between inequality of income from labour and inequality of income from wealth. Moreover, he showed that income from labour generally accounts for two-thirds to three-quarters of total national income, which explains why total income inequality today is closer to inequality in income from labour than wealth inequality.[190]

The higher level of wealth inequality compared to indications of total income inequality has been confirmed by research into the early modern period.[191] Most of the times, only part of society owns wealth. In early modern times, those not obligated to pay tax were often not included in the registers. Therefore, indications of economic inequality in pre-modern times usually represent a specific part of society, in this case wealth owners. Levels of wealth inequality may be supposed to be distorted towards a lower level, since the property-less are not represented.[192] Note, however, the dependence on the inequality measure used and the size of the excluded group. In a comparison of the share of the top 10% tax payers of total wealth to the bottom 10%, inequality will always be higher if the property-less are included compared to a case in which they are excluded. When using a measure such as the

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[189] Piketty, *Capital*, 244.
[190] Ibidem, 263.
[191] Alfani, Ryckbosch, 'Growing apart', 145.
[192] Ibidem.

Gini coefficient, on the other hand, inequality levels may decrease if the group of property-less is sufficiently large.

One should also be aware that inequality of income from wealth may be greater than inequality of wealth ownership.[193] This closely relates to the portion of society covered by the source. When real estate and financial capital are taxed, and property of lesser value such as household goods are excluded, the group of 'property-less' will be larger than in a tax register including the latter.

Direct income taxes are comparatively rare to find for the pre-modern period. Again, one should be aware what types of income were taxed, and which part of society is represented in the source. Direct taxation was often initiated by rising war-related expenditures, and thus often levied in periods of military threat. This also means that they were usually levied for a specific number of years only, which potentially makes them less suitable for long-term analyses over multiple centuries.[194]

For this reason, long-term analyses often make use of proxies for total income inequality. Fiscal sources used for this purpose are house rents. Such data is available for many places, and typically covers multiple centuries. It is argued that expenditure on housing is closely tied to permanent income – a measure of average income over several years.[195] On the downside, boarders and sub-renters are usually missing in the source.[196] Distortion of the inequality distribution by fluctuations in supply and demand on the housing market is another disadvantage of house rents as a proxy. For early sixteenth century 's-Hertogenbosch, Hanus argued that a decline in rent inequality does not necessarily imply a decline in income inequality.[197]

In addition, the proportion of the household budget spent on housing decreases with income.[198] The inequality distribution is thus truncated at the top, resulting in an underestimate of inequality levels. Gini coefficients based on house rents tend to be significantly lower than Gini coefficients based on direct income taxes; particularly wealth taxes.[199] Consequently, absolute inequality levels based on different types of sources may not be comparable to each other. For this reason, Alfani and Ryckbosch compare trends rather than absolute inequality levels in their comparative study of Netherlandish and Italian regions.[200]

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[193] Piketty, *Capital*, 243.
[194] Ryckbosch, 'Economic inequality and growth', 5; Hanus, *Affluence and inequality*, 294; Van Zanden, 'Tracing the beginning', 647.
[195] Ryckbosch, 'Economic inequality and growth', 5-6; Hanus, *Affluence and inequality*, 143.
[196] Ryckbosch, 'Economic inequality and growth', 6-7; Hanus, *Affluence and inequality*, 143-144.
[197] Hanus, *Affluence and inequality*, 144-146.
[198] Ryckbosch, 'Economic inequality and growth', 6-7; Hanus, *Affluence and inequality*, 143-144.
[199] Alfani, Ryckbosch, 'Growing apart', 145; Van Zanden, 'Tracing the beginning', 648-649; Ryckbosch, 'Economic inequality and growth', 6; Hanus, *Affluence and inequality*, 141.
[200] Alfani, Ryckbosch, 'Growing apart', 145.

5.3 Income inequality in Nijmegen

5.3.1 Sources: Nijmegen's tax registers

Chapter 4 already discussed the *Familiegeld* tax registers of Nijmegen in great detail. This section sums up the register's advantages and disadvantages as a source to measure economic inequality.

The main plus-point of these tax registers is the presence of practically all households within Nijmegen. Even exempt households are mentioned, although not all of them are individually described. Their presence offers the possibility to make estimates about inequality in society as a whole. The data contains information on imposed sums as well as actually paid sums. The analysis of economic inequality in Nijmegen will be mainly based on imposed sums, since the system of discounts and fines would distort an analysis based on actual payments. Fine-tuning of the analysis is made possible by information on non-payments and remarks about people whose taxes were revised to a lower category by degree of the city council. Revisions will only have taken place if the means of the taxpayer were overestimated, so calculations of inequality levels may be a little different from reality.

The use of classes for taxation may lead to misrepresentation of the actual relations within a society, because differences in income are smoothed out. The tax register of 1694, however, contains 82 tax classes. This high number guarantees a rather detailed representation of mutual relations, which is reflected in a refined Lorenz curve.

As discussed in chapter 4, the *Familiegeld* tax within the Quarter of Nijmegen was a tax on all kinds of income. Such direct income taxes on total income were rare in the early modern period.[201] On the one hand, this source offers a rather complete picture of economic inequality in this society. Taxes focussing on a particular kind of income, such as income from real estate, exclude the part of society which is not obtaining income in that way. The source thereby offers rather unique insight in an inland middle size city in the eastern part of the Low Countries. On the other hand, comparable data is hard to find. As far as such taxes have existed, they have only been limitedly analysed so far. The current analysis could be extended by analysing the same source in other parts of the Quarter of Nijmegen. This source can probably be found in other Quarters of Guelders as well. The tax has been levied for series of years in the second half of the seventeenth century up to and including at least the beginning of the eighteenth century. The next section will compare the current results for Nijmegen to a limited number of results based on commensurable sources for other parts of the Low Countries.

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[201] Ryckbosch, 'Economic inequality and growth' 5; Hanus, *Affluence and inequality*, 294; Van Zanden, 'Tracing the beginning', 647.

5.3.2 Measuring economic inequality: Nijmegen anno 1694

The previous sections provided us with all background information necessary to estimate economic inequality in Nijmegen in 1694. This subsection will take a look at a Lorenz curve for Nijmegen's taxpayers in 1694. The representativeness of the corresponding Gini coefficient for society as a whole will be debated by estimating the influence of exempt groups. Afterwards, inequality in Nijmegen will be compared to the situation in other cities in the Low Countries in subsection 5.3.3.

Figure 5.1 Lorenz curve for Nijmegen, 1694

SOURCE: *Familiegeld* registers 1694, RAN, *OAN*, inv. no. 2533.
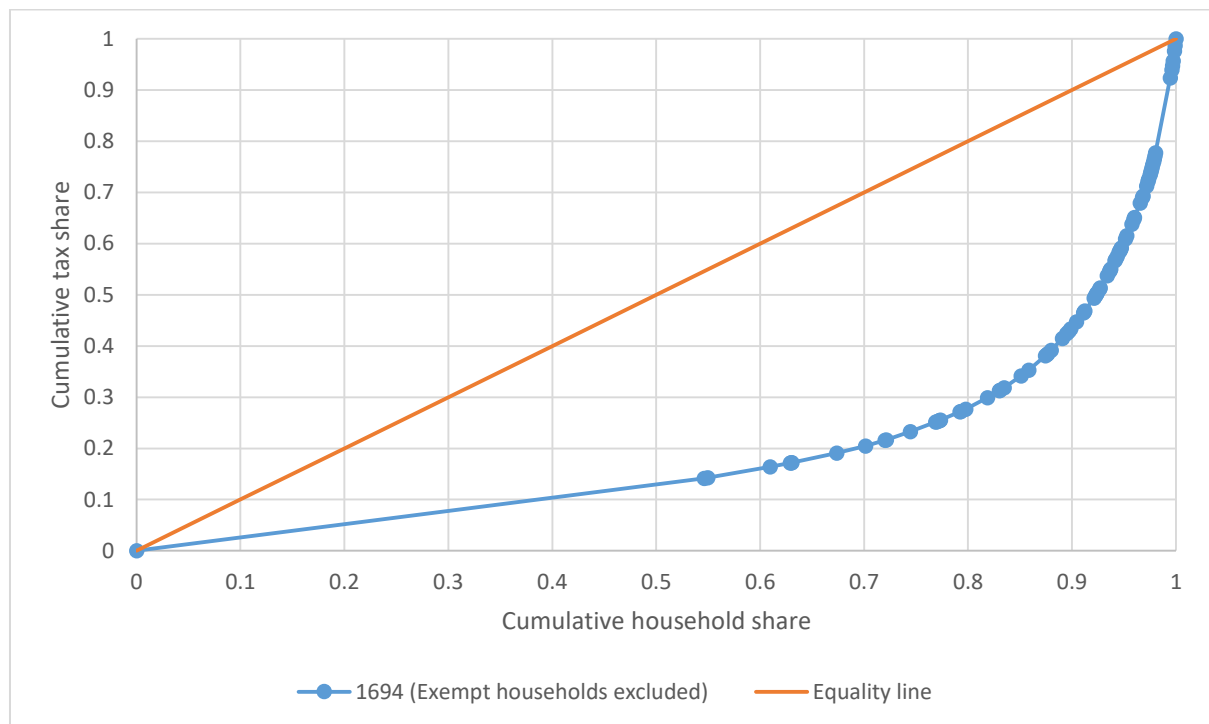
Figure 5.1 shows the Lorenz curve for Nijmegen in 1694. Since exempt groups are excluded, this graph represents economic inequality among inhabitants of Nijmegen who were obliged to pay tax. The corresponding Gini coefficient is 0.626. In 2013, the Gini coefficient based on household income for modern countries was 0.309 for the Netherlands, 0.639 for Namibia, and 0.631 for South Africa. Of course, this is not a perfect parallel, if only because these countries include cities as well as rural areas. However, these examples may allow us to place this number for Nijmegen and following Gini coefficients in our modern framework. Namibia and South Africa are among the most unequal countries in the world.[202]

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[202] http://hdr.undp.org/en/content/income-gini-coefficient (31 January 2017).

The Lorenz curve of Nijmegen in 1694 shows that a majority of circa 55% of the households was responsible for only 15% of the entire proceeds estimated.[203] These households represent taxpayers in the lowest category only. Taking into account that payment is unknown for circa 34% of the entries in this category, the basis of Nijmegen's society will have consisted of people of rather modest means. This is illustrated by the story of the earlier mentioned Matthijs Coenen, who informed the city council of his difficulties to support his family despite of his many jobs. In addition, references to occupations such as laundrywomen were found among the lowest tax class.[204] These households were disposed of a modest, taxable income, which in some cases was just enough to scrape a living.

Appendix B7 shows that the top 1% of the taxpaying households accounted for 12.5% of the imposed tax. The top 10% of the households did account for circa 56.5% of the estimated proceeds, and their sums varied incredibly, between ƒ 17.55 and ƒ 133.-. In the end, only 6% of the actual proceeds was collected from the lowest category taxpayers, while approximately 62% was paid by the 10% taxpayers in the highest categories.

The taxpaying part of Nijmegen accounts for 88% of the total number of entries in the register. The mentioned Gini coefficient's representativeness for the entire society can be tested by including estimates of the number of non-taxpayers and their financial means to the calculation. Appendix B2 provides an estimate of the minimum and maximum number of households represented by entries of those who were exempt from paying tax. Table 5.1 contains estimates of the inequality distribution for Nijmegen as a whole by including these exempt households in various ways. Unsurprisingly, the Gini coefficients in Table 5.1 hint at a more unequal society if these people are included.

The highest Gini coefficients are measured for cases D3 and E3, in which the estimated maximum number of exempt households is taken as a starting point. For the extreme and unrealistic case in which they are assumed to have no income at all (resulting in a tax sum of ƒ 0.00), the Gini coefficient differs approximately 13% from case A, which represents taxpayers only. The influence of soldiers, paupers and exempt noblemen on these numbers has been tested in cases E up to and including H.

The garrison in Nijmegen around 1694 is estimated at 3,000-5,000 soldiers.[205] This number must have had a tremendous influence on a city of approximately 10,000 inhabitants. It is not possible to recognize this number of soldiers in the tax registers of 1694, nor to calculate their number. It is, however, possible to exemplify their influence on inequality levels in Nijmegen. Appendix B2 shows that the number of unidentifiable paupers is much lower than the number of soldiers. Most households too poor to pay are represented by a single entry, even if they are described by profession instead of name. Especially the unknown number of soldiers thus determines the variation in Gini coefficients,

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[203] Percentages mentioned in the following paragraphs can mainly be found in appendix B4-B6.
[204] RAN, *OAN*, inv.no. 331 (1694), inv.no. 2533 (1694) scan 097.
[205] Klep, 'De economische en sociale ontwikkeling', 337.

which is reflected in cases F1-F3. The differences between Gini coefficients are very small if military entries or households are not included.

Case G tests the influence of nine noble and affluent households on the inequality distribution. They are alternately placed in categories of ƒ 133.00 and ƒ 71.60. These households probably belonged to society's top, so they might at least have been placed in the category of ƒ 71.60. This category contained a large number of 21 households, in contrast to surrounding categories which only contained one or two households. It was the highest category in which members of the city council were placed, and most of them were indeed placed in this category.[206] The categories in this range formed the top 2% of taxpayers, and accounted for approximately 22% of the total amount of tax which was supposed to be collected. Cases G1 and G2 barely differ; the same holds true for cases G3 and G4. Differences between G1 and G2 on the one hand, and G3 and G4 on the other result from the large group of other taxpayers. Only if more variation among exempt taxpayers is assumed in cases H1 and H2, some influence of these nine affluent households is noticeable. Nevertheless, Gini coefficients for cases H1 and H2 are still of the same order of magnitude.

This subsection showed that exempt households could have a significant influence on estimated inequality levels. Especially the garrison complicated the estimate of inequality in Nijmegen. Given the scarce information on exempt taxpayers, a deviation of 13% at most is acceptable if one aims to study developments within Nijmegen over time. However, these findings also exemplify the necessity to provide a clear description of exempt groups, preferably including an estimate of their numbers, if one aims to compare inequality levels among different cities. The next subsection aims to elucidate the meaning of measured inequality levels for Nijmegen in 1694 by a comparison with other early modern cities in the Low Countries.

Table 5.1 Gini coefficients for Nijmegen, 1694, including estimates of non-taxpayers

SOURCE: *Familiegeld* registers 1694, RAN, *OAN*, inv. no. 2533.

	Represented part of society	Gini coefficient
	Based on entries	
A	Taxpayers only, exempted excluded	0.626
B	Taxpayers only, exempted excluded	0.646
	Taxpayers in category ƒ 1.80 who did not pay: ƒ 1.50[207]	
	Taxpayers in adjusted category decreed by the city council[208]	

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[206] Chapter 6, table 6.5.
[207] This is an imaginary category slightly lower than the lowest category in the source, to distinguish between differences in affluence that must have existed at the bottom of society.
[208] Five households were allowed to pay a lower sum by order of the city council.

C	Taxpayers All exempt entries: ƒ 0.00	0.672
F1	Taxpayers Exempt entries excluding military entries: ƒ 0.00	0.667
	Based on households[209] *Taxpayers; the estimated number of exempt households included as follows*:	
D1	Estimated bare minimum: ƒ 0.00	0.674
D2	Estimated 'realistic' minimum: ƒ 0.00	0.681
D3	Estimated maximum: ƒ 0.00	0.760
E1	Estimated bare minimum: ƒ 1.80	0.656
E2	Estimated 'realistic minimum: ƒ 1.80	0.660
E3	Estimates maximum: ƒ 1.80	0.709
F2	Estimated minimum, excluding military households: ƒ 0.00	0.668
F3	Estimated maximum, excluding military households: ƒ 0.00	0.674
G1	Nobility: ƒ 133.00 Rest exempted ('realistic' minimum): ƒ 0.00	0.671
G2	Nobility: ƒ 71.60 Rest exempted ('realistic' minimum): ƒ 0.00	0.673
G3	Nobility: ƒ 133.00 Rest exempted ('realistic' minimum): ƒ 1.80	0.651
G4	Nobility: ƒ 71.60 Rest exempted ('realistic' minimum): ƒ 1.80	0.652
H1	Nobility: ƒ 133.00 French refugees: ƒ 1.80 Military households ('realistic' minimum): ƒ 1.80 Rest exempted ('realistic' minimum): ƒ 1.50 Taxpayers in category ƒ 1.80 who did not pay: ƒ 1.50 Taxpayers in adjusted category decreed by the city council	0.668
H2	Nobility: ƒ 71.60 French refugees: ƒ 1.80 Military households ('realistic' minimum): ƒ 1.80 Rest exempted ('realistic' minimum): ƒ 1.50 Taxpayers in category ƒ 1.80 who did not pay: ƒ 1.50	0.652

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[209] Appendix B offers an explanation of the estimated number of households in Nijmegen in 1694.

| Taxpayers decreed by the council in adjusted category | |

5.3.3 Nijmegen in a Netherlandish perspective

A limited number of studies offer Gini coefficients based on direct income taxes comparable to the tax registers of *Familiegeld* in Nijmegen. These Gini coefficients are represented in figure 5.2. Just like this thesis, they focus on one specific year only. This hampers the commensurability of the data, but other factors are more troubling. Appendix C characterizes these Netherlandish cities and the sources at the basis of the studies. Although all studies discuss possible exempt groups, results are delivered as point estimates, and estimations of the margins of error are almost never provided. Only Hanus estimates the influence of these groups on total inequality levels.[210] Van Zanden discusses the way the number of exempt poor can be estimated for Deventer, Kampen and Zwolle, but does not offer actual data other than an example for Kampen.[211] This impedes a comparison between Gini coefficients of these cities, particularly since the error rates possibly overlap.

This is confirmed by a look at Gini coefficients based on house rents. The absolute values of these Gini coefficients are not comparable to the Gini coefficients based on the direct income taxes under discussion here. However, for some cities, Gini coefficients have also been calculated based on house rents. For multiple years, inequality levels in Amsterdam are approximately 10% higher than inequality levels in 's-Hertogenbosch. Values for Delft, Dordrecht and Rotterdam are lower than values for Amsterdam, and comparable to 's-Hertogenbosch.[212] A study of values for similar years may prove whether a similar trend is indicated by calculations based on direct income taxes. The yellow error bar in figure 5.2 indicates the possible direction of the error rate for Amsterdam: values are possibly higher than those for sixteenth-century 's-Hertogenbosch. The red error bar indicates the direction for other cities in Holland: these are probably comparable to 's-Hertogenbosch and lower than Amsterdam.

An underestimate of inequality levels for these cities in Holland in comparison to other cities under discussion is also suggested by the characterization of people excluded from paying tax in Holland.[213] Only those with a yearly income over 600 guilders were taxed. For Amsterdam, the exempt group was estimated at 75% of the entire population.[214]

The previous subsection showed the significant influence of the garrison on income inequality levels in Nijmegen. This is visualized by the grey error bar in figure 5.2. The orange error bar excludes the

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[210] Hanus, *Affluence and inequality*, 41, 299.

[211] J.L. van Zanden, 'Industrialisatie en inkomensverdeling in Overijssel, 1750-1875', *Bijdragen en Mededelingen betreffende de Geschiedenis der Nederlanden* 109-3 (1994) 434-449, q.v. 436-439, 444

[212] Ryckbosch, 'Economic inequality and growth', Appendix B; Soltow, Van Zanden, *Income and wealth inequality*, 35.

[213] Appendix C.

[214] C. Lesger, *Het winkellandschap van Amsterdam: stedelijke structuur en winkelbedrijf in de vroegmoderne en moderne tijd, 1550-2000* (Hilversum 2013) 133.

garrison from the analysis, which results in a much smaller error rate, and a Gini coefficient close to current calculations for cities in Holland and Overijssel. Just like Nijmegen in 1694, Deventer and Zwolle may also have lodged a garrison around 1750.[215] Van Zanden does not discuss the presence of garrisons. Possibly, military men are excluded from his analysis. The case study of Nijmegen indicates that the presence of a garrison may have been of determinative influence on socio-economic relations in a city. Whether the presence of garrisons influenced inequality levels among non-military inhabitants over time deserves to be investigated in the future. The difference between garrison cities and non-garrison cities might provide an explanation for differences in the development of economic inequality levels between early modern European cities.

The test case of Netherlandish cities also shows differences in the nature of fiscal taxes in different parts of the Dutch Republic.[216] Piketty strongly emphasizes the influence of the development of a more progressive fiscal system on inequality levels in many European countries at the beginning of the twentieth century.[217] Milanović also considers progressive taxation a possible force of influence which may drive inequality down in societies after the *Industrial Revolution* only.[218] However, flat taxes and even progressive taxes were not entirely absent in the pre-industrial period. The experimental introduction of the *Familiegeld* tax in Amsterdam was an explicit attempt to introduce a progressive, and more 'fair' tax.[219] Moreover, an increase in progressive taxes during the seventeenth century has been observed in Holland.[220] For other Netherlandish regions, the nature of all taxes has been less well researched. In Nijmegen, *Familiegeld* was probably proportional in character, although this has not been conclusively proven yet.[221] In general, the fiscal system of Guelders has been given little attention so far. The influence of the cities' taxation systems on economic inequality levels can only be studied properly if the nature of all taxes levied in these cities are taken into account. The prominent role of progressive taxes in the current debate challenges to take a more detailed look at the influence of differences in fiscal systems between different regions in the Dutch Republic on inequality levels in the future.

Even though the commensurability of the data is limited, inequality levels in all of these early modern Netherlandish cities seems to have been comparable if military men are excluded. Only the

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[215] https://www.groningerarchieven.nl/onderzoek/zelf-onderzoek-doen/onderzoek-naar-militairen (11 May 2017); HCO Deventer, 0691 *Schepenen en Raad van de stad Deventer, periode Republiek*, inv. no. 516; HCO Zwolle, 0700 *Stadsbestuur Zwolle*, inv. no. 4481.

[216] Appendix C, column M.

[217] Piketty, *Capital*, 495-514.

[218] Milanović, *Global inequality*, 4, 56.

[219] Oldewelt, 'De beroepsstructuur van de bevolking der Hollandse stemhebbende steden', 80-81.

[220] W. Fritschy, M. 't Hart, E. Horlings, 'Long-term trends in the fiscal history of the Netherlands, 1515-1913', in: B. Yun-Casalilla , P. K. O'Brien (eds.), *The rise of fiscal states: a global history 1500-1914* (Cambridge 2012) 39-66, q.v. 59-60.

[221] See chapter 4.2.

Gini coefficient of Kampen possibly falls outside the error bars of other cities: a phenomenon whose explanation falls outside the scope of this thesis.

Figure 5.2 Gini coefficients of income inequality in cities in the early modern Low Countries

SOURCES: RAN, *OAN*, inv. no. 2533 (Nijmegen); Hanus, *Affluence and inequality*, 141 ('s-Hertogenbosch); Soltow, Van Zanden, *Income and wealth inequality*, 35, 59 (Amsterdam, Delft, Dordrecht, Rotterdam, Deventer, Kampen, Zwolle); Ryckbosch, 'Economic inequality and growth', Appendix B (comparison values Holland and 's-Hertogenbosch).

NOTE: Garrison cities are indicated by a square. Error bars for 's-Hertogenbosch are estimated by Hanus. Grey error bar for Nijmegen: maximum error rate. Orange error bar: maximum error rate without military men and women. Yellow error bar: estimated direction of error rate for Amsterdam. The Gini coefficient for Amsterdam is expected to be higher than the value for 's-Hertogenbosch. Red error bar: estimated direction of error rate for cities in Holland other than Amsterdam. Inequality for these cities is expected to be lower than inequality in Amsterdam.
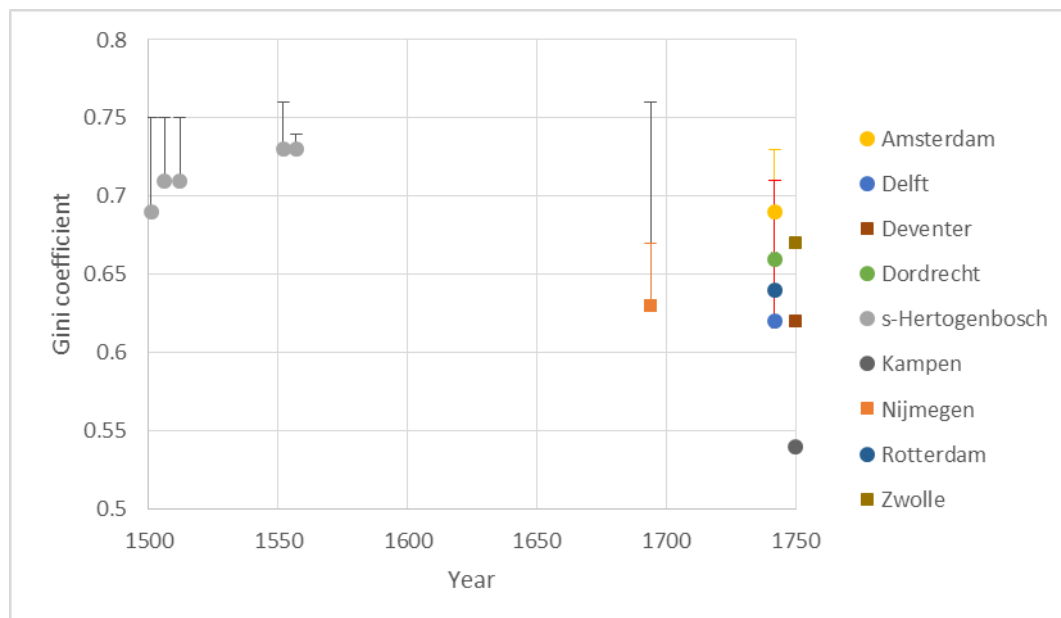
5.4 Interim conclusion

This chapter showed that the level of income inequality in late-seventeenth century Nijmegen seems to have been comparable to inequality levels in other early modern Netherlandish cities if military men are excluded. An examination of including exempt groups in different ways in the calculation of a Gini coefficient showed that particularly the garrison influenced inequality levels in Nijmegen to a large extent. The influence of garrisons on the development of inequality levels in early modern cities are a promising subject for future research.

A comparison of the data on Nijmegen to studies of income inequality on other cities in the Dutch Republic was complicated, because most studies do not offer an estimate of the influence of exempt

groups. Based on this data, it is thus not possible to compare inequality levels and residential patterns between these cities. The methodological possibility to study this relation can be examined more closely, though; the next chapter will focus on this question.

Chapter 6

Residential segregation

The previous chapter showed that economic inequality levels were comparably high in early modern Netherlandish cities. This chapter studies how these economic inequality levels were reflected in residential patterns. First, it will be discussed how residential segregation may be measured, focussing especially on methods and techniques employed in the test case of Netherlandish cities. Special attention will be given to the question how residential patterns may be studied in relation to economic inequality levels in early modern cities. Secondly, residential patterns in late seventeenth century Nijmegen will be looked at and discussed in a Netherlandish perspective.

6.1 Measuring residential segregation

6.1.1 General questions and approaches

Studying residential segregation means searching for the population composition of city units in relation to one another. In order to observe these patterns, quantitative data on, in this case, economic inequality has to be linked to geographical data. An essential point of discussion in this strand of research is the definition of the geographical units on which the study is based. As discussed in chapter 2, segregation may be observed on different levels, such as the level of wards, the street-level, and even within buildings. Evidently, if a source offers data per parcel, a more detailed analysis may be performed compared to a study which only has data per street at hand.

Aside from the possibilities offered by the source, the researcher still has to define these units of study. For example, the borders of contemporary wards or streets may be chosen, or artificial neighbourhoods of, for instance, equal surface area or number of inhabitants may be defined. Some researchers limit their analysis to pre-defined spatial units, others perceive patterns overarching or within the initial units of measure. A disadvantage of using contemporary borders mentioned in the source, is the decreasing ability to compare results from different years or from different cities. Borders of wards, for example, may change over time, and geographical units of different cities vary by definition. This fundamental problem will be discussed later in this section.

The choice of sources does not only influence the possible geographical units of measure, it also influences the commensurability of residential segregation levels. The previous chapter already mentioned the difference in inequality levels measured based on house rents compared to income levies. Income levies generally show more variation in economic means of the inhabitants, which will also be reflected in geographical patterns. This is a minor problem if one only aims to compare patterns. Trends of the development of residential patterns in a city based on different types of sources

will probably resemble one another, even though changes may be flattened or more pronounced compared to trends based on another source. The richest and poorest neighbourhoods discerned will probably still be the same. However, for studying to what extent economic inequality levels within a certain city unit changed, i.e. testing the development of the level of residential segregation on economic means, commensurable data is needed.

To study residential segregation, quantitative data on economic means and inequality has to be linked to the geographical units. This has to be done in such a way that we may study patterns in the composition of the units compared to other units, and ultimately the city's level average. For example, one may map the value of every single parcel in a city, or divide all values into four categories. One may also map the extent to which each parcel has a lower or higher value than the other parcels in its street, ward, or the entire city. The values of several parcels may be combined to obtain an impression of the distribution of inequality on the level of, for example, block faces. In short, a measure which offers the opportunity to study several units in relation to one another has to be selected. After visualizing the differences between certain geographical units, one may ask how to express to what extent the entire city is, and parts of the city are segregated. We are thus also looking for a measure to rate segregation.

In contrast to the study of the development of economic inequality, where the Gini coefficient has become one of the standard tools, a standard way to express differences in the distribution of economic welfare over cities has not been developed in the study of residential patterns. The next subsection provides an overview of methods and techniques applied in the study of residential patterns in early modern Netherlandish cities. A discussion of the way current results may be compared to one another, and to additional data on Nijmegen, is included.

6.1.2 Characteristics of studies on residential segregation in early modern Netherlandish cities

This survey includes seven cities from three Netherlandish regions: Kortrijk and Gent in the region of Flanders, 's-Hertogenbosch in Brabant, and Amsterdam, Delft, Alkmaar and Leiden in Holland. This subsection focusses on their methodological approach of residential segregation on economic means, although these studies often also discuss other socio-economic characteristics, such as the geographical distribution of professional groups. The comparability of the studies, an important aspect in order to meet the aim to study residential segregation in relation to economic inequality on the city level, will be discussed.

Studies of residential patterns in early modern cities are often part of a socio-economic study of one particular city. This is at least partly due to the time-consuming nature of the research, even after

computer techniques have become commonly available. Most historians and historical geographers discussing residential patterns therefore limit their analysis to a single year.

Within the test case of studies on Netherlandish cities, the study of Daelemans on Leiden around 1580 adheres to this type.[222] Blondé also focusses on a singular city, 's-Hertogenbosch, but he is one of the only researchers comparing data on residential patterns from different years. He carried out five spot checks in the first half of the sixteenth century.[223] Vanneste performs a comparison of two Flemish cities, Kortrijk and Gent, taking the year IV of the French Republican Calendar (1795/96) as a reference point.[224] Lesger and Van Leeuwen, in cooperation with others, studied long term developments in Alkmaar, comparing residential patterns in 1632, 1733, and 1832. Next to this, they compared these residential patterns in Alkmaar to those in Delft in 1832 and preliminary findings on sixteenth and seventeenth-century Amsterdam.[225] A follow-up study offering more detailed data on these preliminary findings has never been published, but an in-depth study of Amsterdam in 1832 was performed. This study on Amsterdam is more like a picture of one single city in a specific time period again than a comparative study. Lesger, Van Leeuwen and Vissers present early-nineteenth century Amsterdam and Delft as pre-industrial cities. These studies are therefore included in this survey of residential segregation in early modern Netherlandish cities.[226]

Leiden and 's-Hertogenbosch

The studies of Daelemans (1975) and Blondé (1987) provide information on city wards only, which is characteristic for older studies on residential patterns. This makes their results hard to compare to those of others. Daelemans' study on Leiden is the simplest study of the spatial distribution of economic means over the city discussed here. He divided the rental values of inhabited houses in six categories, plus a category 'unknown'. Per ward, he indicated the number of houses in each category, and the percentage of houses in each category per ward.

It is illustrative for the incomparability of such information, that Leiden was divided in four wards only. 's-Hertogenbosch was only slightly more populated in the beginning of the sixteenth century

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[222] F. Daelemans, 'Leiden 1581. Een socio-demografisch onderzoek', *A.A.G. Bijdragen* 19 (Wageningen 1975) 206-215.

[223] Blondé, *De sociale structuren*.

[224] Vanneste, *De pre-industriële Vlaamse stad*.

[225] W. van den Berg, M.H.D. van Leeuwen, C.M. Lesger, 'Residentiële segregatie in Hollandse steden. Theorie, methodologie en empirische bevindingen voor Alkmaar en Amsterdam, 16e-19e eeuw', *Tijdschrift voor Sociale Geschiedenis* 24-4 (1998) 402-436; M.H.D. van Leeuwen, C. Lesger, G. Buzing, 'Residentiële segregatie in Delft. Een verkenning van ruimtelijke patronen in 1832', in: O. Boonstra, A. Schuurman (eds.), *Tijd en ruimte. Nieuwe toepassingen van GIS in de alfawetenschappen* (Utrecht 2009) 52-61; Lesger, Van Leeuwen, 'Residential segregation', 333-369.

[226] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie' 102-132.

compared to Leiden at the end of that century.[227] Nevertheless, sources in 's-Hertogenbosch distinguish 9-10 wards. Moreover, the changing number of wards in 's-Hertogenbosch from ten to nine decreased the comparability of results on the level of wards within the city over time.

Blondé used data on taxes on income and on rental values of houses. He calculated the percentage of the total number of taxpayers per ward. This information was visualised in a bar chart next to the percentage of total tax collected per ward. In this way, he obtained an indication of the extent to which wards housed, on average, a relatively poor or relatively rich population. In order to perform a more precise analysis, he combined this information with mean, median, minimum, and maximum values and a coefficient of variation for each ward. Next to this, an index showed the development of the mean sum levied in each ward in comparison to the city average.

Blondé aimed to analyse the development of the extent of segregation in 's-Hertogenbosch over time. Although he gathered a lot of data, his analysis of the change in segregation levels remains confined. In a scatter plot, he plotted the mean tax sum per street against the standard deviation for one year, 1552. This showed a positive correlation between the mean affluence and the economic differentiation in a street. Unfortunately, individual streets are not identifiable for the reader. Next to this, Blondé calculated the distribution of the richest taxpayers over the city wards. He noted their presence in almost all wards during the entire first half of the sixteenth century. Since the number of wards changed during the period of study, Blondé was not able to express these changes mathematically. He did found, however, an overrepresentation of rich taxpayers towards the city centre. He therefore concludes that a 'tendency towards segregation' existed and remained to exist during the first half of the sixteenth century.[228] A more precise indication of change or continuity could have been possible, as will become clear in the next subsections.

Kortrijk and Gent

Detailed studies became more common after the introduction of advanced computer techniques, such as Geographical Information Systems (GIS). From the 1980s onwards, computer mapping was employed universally. In historical studies, however, it has never become as frequently used as anticipated in those early years.[229] Vanneste mentions the time-consuming nature of visualizing

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[227] Blondé estimates the number of inhabitants in 's-Hertogenbosch in the first half of the sixteenth century around 17,600-20,600, and the number of taxpayers varies between ca. 2,400-3,100; Daelemans estimates the number of inhabitants in Leiden in 1581 around 14,000, while he mentiones 2,686 inhabited houses in that year. Blondé, *De sociale structuren*, 49, 143, 155, 166, 179, 188; Daelemans, 'Leiden 1581', 148, 187.
[228] Blondé, *De sociale structuren*, 92.
[229] J.A. Mol, 'Building a parcel based historical GIS for the Netherlands with the cadastre of 1812-1832: results, problems and perspectives', in: M. Busch, S. Kroll, J.E. Olesen (eds.), *Die Schwedische Landesaufnahme von Vorpommern 1692-1709. Ergebnisse eines Editionsprojektes im Kontext der Forschung* (Kiel 2015) 35-54, 160-164, q.v. 35.

patterns on maps with the help of computers. Her background in geography probably explains her rather early use of detailed mapping techniques in this historical study of Kortrijk and Gent.

She studies residential patterns in these cities on the level of streets, and spot-checks the internal differentiation of some characteristic streets on the level of parcels. With regard to the spatial distribution of households of different economic means on the level of streets, she performs a cluster analysis based on two variables, parcel surface and taxable income. Streets within the same cluster resemble each other most with regard to these two variables. For each variable, it is expressed to what extent the cluster deviates from the city-mean. The clusters are city-specific. For Kortrijk three clusters are discerned, for the larger city of Gent five. The spatial distribution of the clusters is visualized by assigning a colour to each cluster, and colouring each street on a map in the corresponding colour.

In order to obtain a representative dataset, Vanneste excluded part of the data from the analysis. Streets containing less than 6 parcels were excluded, but she does not explain why this is number has been defined as the lower limit. Next to this, the largest parcel was sometimes excluded from the calculation of the mean values, especially if this parcel could be considered an outlier in the part of the city in question. On the level of streets, Vanneste thus explicitly aimed to provide a general pattern of spatial differentiation in Kortrijk and Gent.

To test the extent of differentiation within streets, she chose to map socio-economic characteristics per parcel for a limited number of streets. All previously defined clusters were represented by the selected streets. To test economic differentiation within these streets in Gent, Vanneste mapped the rental value of houses on each parcel. These rental values were divided into seven categories, represented on a map by circles of increasing size. For Kortrijk, economic differentiation within streets was tested by data on taxable income per household. Five income categories were distinguished, represented the same way as in Gent. Economic differentiation in streets has to be determined on the face of the different sizes of the circles. Furthermore, for both cities, she qualitatively characterized the buildings within the streets by studying visual sources, such as drawings of façades on builder house plans. In this way, she determined the possible social status associated with houses in the streets.

Although the methods applied in the study of both cities resemble one another, the results were only qualitatively comparable. Therefore, general conclusions on patterns in both cities are compared, especially in relation to characteristics Sjoberg had formulated for the pre-industrial city.[230]

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[230] Vanneste, *De pre-industriële Vlaamse stad*, 182-185, 241, 244-249.

Lesger, Van Leeuwen and co-authors also visualized residential patterns on maps. All of their analyses are based on house rents. The smallest geographical units in their datasets of Alkmaar and Delft are parcels, but the results are presented at the level of house blocks (available for Alkmaar for 1632, and for Delft for 1832), and block faces (Alkmaar 1632, 1733, 1832; Delft 1832). The spatial distribution of economic affluence is indicated by calculating average rents per block and block face, and dividing these values into quartiles. Each block/ block face is coloured in a pattern corresponding to one of the quartiles.

Just like Blondé and Vanneste, Lesger and Van Leeuwen excluded unrepresentative units. Half of the lots within a block had to be made up of residences in order to be included.[231]

The advantage of using quartiles is commensurability of data from different years, and to some extent even different cities, since quartiles relative measure of affluence. The choice for block faces offers the opportunity to study differentiation within streets. Internal differentiation within the block faces remains unclear, however, just like the number of houses per block face. The choice to only map average values may disguise potential mixing of rich and poor households. For example, one particularly high house rent may distort the average house rent of a block face upwardly. If every house block in a particular street contains such a rich household, the street as a whole may seem to contain high-valuable houses, but the presence of households of different economic means remains invisible.

Segregation within the city on the level of blocks and block-faces becomes visible on maps. Homogeneous parts of the city are perceivable by the same colour, or colours of adjacent quartiles. Changes of residential patterns and segregation levels within Alkmaar are qualitatively analysed by means of these maps. It is described whether variance occurs in the periphery and city centre, but no quantitative indication of an increase or decrease in the level of residential segregation in parts of the city is developed. Such a general description of changing patterns is valuable, but the authors also aim to describe whether homogeneity in particular parts of the town changed. By using this method, they may only perceive homogeneity if adjacent block faces have similar colours. Changes from a more complex pattern to a different complex pattern, as present in the centre of town, are hard to interpret with the naked eye. Just like Vanneste for Kortrijk and Gent, Lesger and Van Leeuwen compare Alkmaar and Delft on the basis of general findings for both cities.

Amsterdam

For early nineteenth-century Amsterdam, their analysis is more detailed. The distribution of economic welfare is studied on three levels: wards, blocks, and what we may call detailed block faces. The main

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[231] Lesger, Van Leeuwen, 'Residential segregation', 347.

dataset consists of reconstructed house rents. On the level of wards, the authors analyse where the poorest households and richest households are overrepresented. In order to do so, they defined the number of poorest people as those receiving charity during the winter. The richest part of the city was defined by those who were entitled to vote.

Furthermore, an analysis is performed on the level of block faces, comparable to the ones on Alkmaar and Delft. All house blocks are divided into one of the quartiles of average house rents, and visualized on a map. House blocks containing less than five residences were excluded from the analysis. It is not explained why this number has been chosen as the lower limit.

Next to this, the distribution of individual house rents over the city was mapped. All rental values were divided in one of five categories. By means of an interpolation technique called inverse distance weighting, the most probable value of all locations was calculated. The rental value of locations for which no data is available was estimated by the value of neighbouring locations. This resulted in a slightly more detailed map than one on the level of block faces would have been.

In contrast to the study of Alkmaar and Delft, an indication of segregation levels in the city is given. The city was divided in artificial geographical units of equal surface, and the coefficient of variation was calculated for the residences within these cells. On a map, the variance between house rents near one another was visualized. Rather than mapping the distribution of wealth only, more of such maps could be highly valuable in the debate about the development of residential segregation in early modern cities.

In conclusion, Lesger, Van Leeuwen, and Vissers estimated the average distance between households of different and comparable economic means. They calculated the average distance (in a straight line) between houses of all quartiles. For example, the average distance of a household paying a house rent in the lowest quartile to another household in that quartile was shorter than the average distance to a households in any other quartile.

6.1.3 Comparing residential segregation levels

This survey of studies on residential patterns in Netherlandish cities makes clear that comparisons between cities are difficult because of inevitable differences in geographical units. Wards and streets are by definition city-specific. Next to this, some studies take block-faces as a starting point, whereas others focus on differences between streets. The use of different statistical measures, which are sometimes also city specific, does not improve the commensurability of the studies.

Most studies take a measure for economic affluence in a geographical unit as a starting point, such as mean rent paid, and describe segregation by comparing differences between these units. To a limited extent, these analyses are combined with a quantitative measure for inequality in geographical

units in the city, such as the coefficient of variance for the case of early nineteenth-century Amsterdam. The use of maps increases the attractiveness of the results, and improves the way geographical patterns can be discerned. However, even if authors aim to compare residential segregation in the same city over time or between different cities, the data is often only limitedly comparable. For example, Vanneste succeeds to perform a detailed analysis of residential patterns in Kortrijk and Gent, but for the larger city of Gent she made use of more refined categories. Consequently, a comparison of general findings, such as adherence to a centrum-periphery model, is the norm.

The study of residential segregation in early modern cities would benefit from a more refined way to compare levels of residential segregation in different cities. Moreover, this is imperative if one aims to study residential segregation on economic means in relation to economic inequality in the city as a whole. Therefore, I propose a different, more quantitative approach to compare residential segregation between cities in the future. This approach can be used in addition to the current practice of qualitatively describing differences in general characteristics of residential patterns. In the remainder of this subsection, this approach will be illuminated.

The commensurability of the geographical units under study is one of the main problems to be tackled in order to perform a more quantitative analysis of residential segregation levels in the future. I propose to compare residential segregation in geographical units of commensurable function and character. For instance, for every city, a main marketplace, a harbour, and main access roads are discernible. The higher the number of commensurable city units compared, the better the understanding of differences and similarities with regard to residential segregation in early modern cities.

The borders of these geographical units are an aspect which deserves careful argumentation for each city under study. Geographical units may include a number of streets, or consist of a particular part of a street. The same part of a street may be characterized in different ways, and as a result be part of different geographical units. For example, the main market of Nijmegen may be compared to main markets in other cities, but may also be part of a comparison of main axes between cities.

For the study of residential segregation on economic means, it is important to have an indicator of economic affluence per geographical unit in addition to an indicator for economic inequality. The indicator for economic affluence clarifies whether units having a similar function in different cities also housed households of resembling economic means. The indicator for economic inequality points out the extent of segregation. Homogeneous streets indicate segregation, whereas streets with much differentiation indicate residential mixing of households of different economic means. The combination of these indicators enables us to study the possible relation between residential

segregation and economic affluence in particular geographical units. Moreover, it may be studied whether the development of residential segregation in early modern cities over time differed between less and more affluent geographical units.

The above discussed studies on residential segregation in early modern Netherlandish cities generally used the mean as a measure for economic affluence per unit. Related to the mean, the coefficient of variation and standard deviation served as measures for economic differentiation in the studies of nineteenth century Amsterdam and sixteenth-century 's-Hertogenbosch.[232] The coefficient of variation is defined as the standard deviation divided by the mean. It thus describes the amount of variability relative to the mean. A low coefficient of variation indicates a more homogeneous economic composition of the part of society under study. This is a dimensionless quantity, which enables a comparison between cities. The mean, on the other hand, is source specific. This problem could easily be solved by normalizing the mean of each geographical unit by dividing it by the mean of the geographical unit with the highest mean. This results in a value between zero and one. The poorest geographical units will have a value close to zero; the most affluent units a value close or equal to one.

A more troublesome disadvantage of the mean as a measure for economic affluence is the potential distortion by outliers. A single particularly rich household may distort the mean of a geographical unit significantly upwards. Moreover, this approach suggests, at least approximately, a symmetric distribution around the mean of economic means of households in a geographical unit. For the case of Nijmegen, it can be proven that this would be a misleading starting point.

The box plots in appendix D1 visualise the distribution of taxes paid in all wards and streets in Nijmegen housing at least three taxpaying households in 1694. The edges of the boxes represent the 25th and 75th percentile. Percentiles divide a dataset in hundred equal parts. The 25th percentile, for example, indicates that 25% of the observations are smaller or equal to the value in question. Fifty percent of the observations are thus covered by the box. In appendix D1, the end of the whiskers, if present, indicate the minimum and maximum value. The mean and median are indicated by a cross and bar respectively.

The mean of a symmetric distribution equals its median. Furthermore, the number of taxpayers below the mean equals the number of taxpayers above the mean. This means that the distribution of taxpayers of streets approximating a symmetric function are characterized by a box with a mean which equals the median, and a lower part of approximately the same size as the upper part. As can be seen in appendix D1, almost no street in Nijmegen satisfies these requirements. The *Brouwerstraat* in the ward of the *Smidstraat* is an exception, but the *Ganzenheuvel en Brouwerstraat* and *Korenmarkt* in the same ward clearly show opposite behaviour. It will come as no surprise that economic affluence in the

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[232] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 117-118; Blondé, *De sociale structuren*, 91, 204-209.

city of Nijmegen as a whole was asymmetrically distributed, as can be seen in appendix D8. The box plots in appendix D1 show that the same holds true on the level of wards and most streets.

The box plots show that the mean is particularly misleading in indicating levels of economic affluence in the wards. All but one of the mean values lays outside the box. Moreover, a closer look at the tax registers reveals that one or two high taxpaying households determine the mean tax assessed in streets such as the *Haven* and *Korte Brouwerstraat*.

Asymmetric distributions, such as the income distribution in Nijmegen on different geographical levels, are poorly described by two parameters such as the mean and standard deviation only. Box plots are a way to obtain an overview of such distributions, because they visualize five values: the minimum, 25th percentile, 50th percentile or median, 75th percentile and maximum.

Box plots could thus be taken as a starting point for a comparison of commensurable geographical units from different cities. One could, for example, compare the dispersion of the distributions. A measure for asymmetry may be developed by determining the interquartile range per street – the difference between 75th and 25th percentiles. The length of the upper part of the box (75th percentile minus median) may be divided by the interquartile range to obtain a measure for asymmetry above the median. Similarly, the length of the lower part of the box (median minus 25th percentile) may be divided by the interquartile range to obtain a measure for asymmetry below the median. These values are comparable between cities.

Box plots are hard to analyse at a glance precisely because of the multiple variables represented in them. If one aims to visualise all streets in one figure, one may choose to plot a single measure for economic affluence against a single measure for economic inequality. This simplifies the actual distribution, but may be valuable in combination with an analysis of box plots. Figure 6.1 exemplifies such a figure. The already mentioned normalized mean may be used as an indicator for economic affluence.[233]

The previous chapter discussed the value of the Gini coefficient as a measure for economic inequality. The Gini coefficient may therefore be chosen as an indicator of differentiation within geographical units. A Gini close to zero signifies few differences between households in a geographical unit. Since the Gini coefficient is a dimensionless parameter, it is possible to compare economic inequality in commensurable units from different cities to one another.

Figure 6.1 Example of a comparison of residential segregation in commensurable geographical units from different cities

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[233] This normalized mean was defined as the mean of a street divided by the mean of the street with the highest mean in the city.
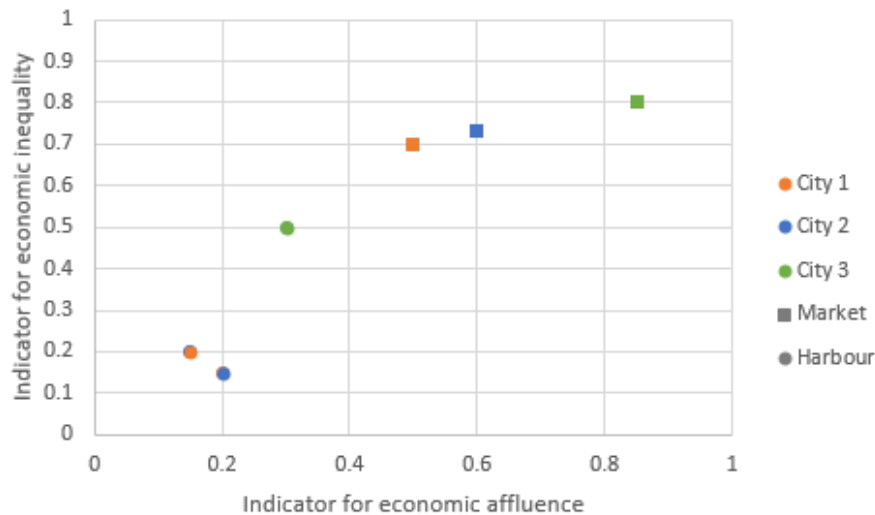
This proposed approach of comparing commensurable geographical units between cities by means of statistical measures which offer a more complete view of the distribution than can be expressed by a single index only, could be partially applied in this thesis. The case of Nijmegen has been studied by means of box plots visualizing the income tax distribution in wards and streets. The Gini coefficient and mean tax assessed are used as single indicators of economic inequality and economic affluence respectively. Attention is paid to the possible relation between levels of economic affluence and economic inequality in geographical units. In addition, these indicators are used to visualize the geographical distribution of economic inequality and economic affluence over the city by means of maps.

The proposed method of using commensurable geographical units to compare residential segregation levels between cities could not be employed in the comparative analysis of Nijmegen to other Netherlandish cities. The data offered by current publications does not allow for such an approach. Residential patterns in Nijmegen in relation to other Netherlandish cities will therefore be mainly discussed in a more traditional way, comparing general patterns and findings described.

The next section will first discuss the sources used as a starting point for the study of residential segregation in Nijmegen, and specify the methodological approach with regard to this case. Previous interest in residential patterns in Nijmegen will be briefly discussed in subsection 6.2.2, followed by an in-depth analysis of these patterns in 1694 in subsection 6.2.3. The last subsection places these patterns in a Netherlandish perspective.

6.2 Residential segregation in late seventeenth century Nijmegen

6.2.1 Sources and methods

The tax registers of *Familiegeld*, which form the basis of this thesis, are an excellent source to study the geographical distribution of economic means and residential segregation in seventeenth century Nijmegen. It is possible to link information on economic differentiation to locations on a map of the city. As discussed in chapter 4, the number of tax categories suggests a rather detailed reproduction of the income distribution on the level of households. Non-taxpayers are mentioned, although not always on the household-level. Information is available for eight contemporary wards and the streets within these wards. Definitive specification of the living place of taxpayers within the street is, unfortunately, not possible based on this source solely.

Geographical units offered by the source, the wards and streets, will be at the basis of this study. Information on the level of wards is mainly relevant for the study of Nijmegen. The wards, called *hopmanschappen*, served as administrative units. Studying their economic composition may improve our understanding of the city's policy. An analysis on the level of streets enables a more detailed study of residential segregation in Nijmegen. The information obtained in this way may serve as a starting point for a comparison of patterns between different cities. In total, 87 (parts of) streets could be discerned.

Data on streets has been organized by ward, and within wards alphabetically. In this way, streets are easily findable, and characteristics of the wards become clear. Wards thus structure the data, but an analysis exceeding wards is not impeded. In some cases, parts of streets fell within different wards, which offers the opportunity to study differences within the same street. The borders of the wards were established after 1591, but it is unclear how they have been determined.[234] The boundaries of the street-parts in this study are thus rather random. Nevertheless, it has been chosen to take these street-parts as a point of departure instead of combining them and study the streets in question as a whole. In this way, it is possible to study internal differences in streets. Sometimes streets were split lengthways; sometimes breadthways. Ten streets could be analysed in more detail. In two cases, the same street was mentioned in the same ward twice, but it was not possible to identify the meant sides of the street. These parts have therefore been combined in the analysis.

In the boxplots, only taxpayers are represented. 'Streets' containing less than three taxpaying entries were excluded from the analysis, because three entries is the minimum number of entries needed to constitute a box plot with a different minimum, maximum and median value. As a result of this precondition, 13 streets were excluded; they are specified in table D1.1 in appendix D1. Some of these streets represent one household only, while others consist of multiple non-taxpaying

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[234] Gorissen, *Stede-atlas van Nijmegen*, 49-50.

households. Information offered by the tax register about the living places of exempt households and defaulters will be used to refine the analysis of wealth and poverty within streets and wards.

A geographical visualisation of residential patterns is offered by four maps. Boxplots are hard to visualise on a map. Instead, a single parameter had to be chosen. Map 1.1 in appendix D7 shows the distribution of economic affluence for the eastern half of the city, where the mean tax is taken as an indicator for wealth. Map D7.1.2 shows the internal rate of equality within the streets by means of the Gini coefficient. Map D7.2.1 and D7.2.2 serve the same purpose for the western half of Nijmegen. Values are represented by a gradual colouring system to enhance the visibility of differences between streets. This geographical visualisation strengthens the possibility to analyse residential patterns in Nijmegen, but will only be used in combination with the box plots and original database for reasons mentioned before. These maps also provide the possibility to visually compare patterns in Nijmegen to patterns in other Netherlandish cities.

The land register of 1830 serves as a basis for the geographical visualisation and analysis of wealth and inequality in the city. This is one of the oldest maps available for Nijmegen on the level of parcels. The street and parcel pattern of 1830 resembles the pattern of 1694 to a large extent.[235] The city walls were broken down in the second half of the nineteenth century only. The main difference is the number of buildings in the southern part of the city. Intramural fields would become built-on during the eighteenth and beginning of the nineteenth century. A painting from bird's-eye view made around 1669 may serve as a reference point for the situation in the seventeenth century. This map represents the main buildings, number of houses, and the proportion between buildings very well.[236] Occasionally, the quantitative analysis will be completed by a visual analysis of these maps. Parcel size and the sizes of houses painted on Feltman's map will be used as an indicator for wealth.

Streets in the tax register could be identified as locations on the map by means of close examination of the tax register itself, the parcels assigned to each street in the nineteenth century, and Van Schevichaven's description of names used for streets over time.[237] Only the exact locations of the houses in the *Kerkhof*, *Het Hof*, and *Het Buitenhof* remain uncertain, and have been globally indicated. The register mentions four households only in *Het Kerkhof*, whereas multiple houses are visible on both maps. Possibly, these houses were not in use in 1694, or its inhabitants were not mentioned in the tax registers. *Het Hof* certainly is the location currently referred to as the castle *Valkhof*, and

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[235] H. Clevis, *Nijmegen: investigations into the historical topography and development of the Lower Town between 1300 and 1500* (Utrecht 1990) 500.

[236] G. Lemmens, *Nijmegen in 1669 Vogelvluchtgezicht van Hendrik Feltman*, Museumstukken 9 (Nijmegen 2003) 13-17, 34; Clevis, *Nijmegen: investigations into the historical topography*, 281-282, 287. The map of Feltman may be found in appendix D6.

[237] RAN, *OAN*, inv. no. 2533; H.D.J. van Schevichaven, *Oud-Nijmegen's straten, markten, pleinen, open ruimten en wandelplaatsen* (Nijmegen 1896); http://home.kpn.nl/lesem000/nmstraat.html (27 April 2017).

Buitenhof refers to houses in its vicinity. It remains uncertain, however, which houses are referred to exactly.

In order to enhance uniformity, street names have been standardized to modern spelling. The aim to create uniform and identifiable names determined this process. For example, *Corte Burghstraet* became *Korte Burchtstraat*, and *Sijckerstraet* and *Syckerstraet* were both spelled as *Ziekerstraat*. The *Boddelstraet* became *Boddelstraat*, even though this street is also known as the *Bottelstraat*. The name of the street in the source was leading instead of the name used on the map of 1830. The *Krijckenbeeck*, for example, is standardized as *Kriekenbeek* instead of *Vijf Ringen Gastje*.

6.2.2 State of affairs: residential segregation in Nijmegen around 1694

Every city has streets, alleys and avenues with reputations of housing the dregs of the city, its bakers, its butchers, or the cream of society. Consequently, no city's historiography is completely ignorant of a socio-economic description of the city's geography. Nijmegen is no exception. Particularly valuable are the descriptions of Van Schevichaven, archivist in Nijmegen at the end of the nineteenth until the beginning of the twentieth century. In one of his many works, he alphabetically describes all streets and squares based on fragments of information scattered through the archives.[238] Their location and changes in names obtain his specific attention. Moreover, he often compares his archival findings to the contemporary, nineteenth-century situation. This is particularly valuable since the physical structure of the city has significantly changed since.

The other main study about Nijmegen with a specific geographical approach has been written by archaeologist Clevis.[239] He linked archaeological evidence to historical sources for the period 1300-1500. His archaeological analysis focussed on immovable finds, excavated on various spots in Nijmegen. His historical analysis is based on the Fraternity records, title-deed rolls (*schepenprotocollen*), Nijmegen's town accounts, and a nominative tax levy (*Nominatieve Belastingcijns*) from 1422/23. His reconstruction of the socio-economic stratification of four streets resembles the aim of this thesis. Clevis aimed to link profession and amount of tax paid to specific parcels in order to study socio-economic stratification within streets.

Kam has aimed to provide a more general impression of the economic stratification of the city after the French occupation between 1672 and 1674. In order to free hostages, the city levied a specific tax three times in the 1680s. Kam provides a transcription of the tax register of 1682, but does not offer a

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[238] Van Schevichaven, *Straten, markten, pleinen*.
[239] Clevis, *Nijmegen: investigations into the historical topography*.

thorough socio-economic analysis.[240] In addition, there are some small studies which focus on specific parts of the city, such as the quay of the river Waal, and the Smidstraat.[241]

This thesis will add a systematic, quantitative investigation including a geographical visualization of the income distribution in Nijmegen in 1694 to this corpus. Patterns of residential segregation on income in the city as a whole will be studied on the level of wards and streets. The results of this study will be compared to current impressions of the spatial socio-economic design of early modern Nijmegen.

6.2.3 Analysis and results

Segregation on the level of wards

In late seventeenth century Nijmegen, eight administrative wards were distinguished in Nijmegen. A glance at the boxplots in figure D1.1 in appendix D1 reveals that segregation on the level of these wards was not explicitly present in 1694. Taxpayers from the lowest tax category lived in all wards, and taxpayers from the top category of *ƒ* 71.60 onwards were present in all wards. Except for the wards of the *Burchtstraat* and *Markt*, all median values correspond to the lowest tax category: *ƒ* 1.80. This means that at least 50% of the taxpayers in these wards had to pay *ƒ* 1.80.

Except for the ward of the *Smidstraat*, all mean values fall outside the box. Taken into consideration that all minimum values are *ƒ* 1.80, this implicates that these mean values are higher than the tax paid by at least the 'poorest' 75% of the population in the wards. Mean values alone are thus not a representative indicator of wealth in the wards. In combination with the median values and the sizes of the boxes, the wards of the *Burchtstraat* and *Markt* may be identified as the modestly wealthiest wards. Based on the total income of a tax per ward in 1682, Kam comes to the same conclusion. Kam also takes the number of people in the two lowest categories in relation to the number of people in the four highest categories as a measure for wealth per ward. This measure indicates that the ward of the *Steenstraat* should be considered the most affluent, followed by the *Burchtstraat* and *Markt* again. Using the method of boxplots, the tax register of 1694 does not confirm this finding.

In the data of 1694, the ward of the *Hezelstraat* stands out with regard to poverty. Its box is very small, and the mean value is the lowest of all. Both measures used by Kam, however, indicate that the ward of the *Lage Markt* may be considered the least affluent in 1682. The boxplots of 1694 show that the second smallest box belongs to the ward of the *Lage Markt*, but its mean is comparable to other wards and the highest tax is paid by a household in this area. A glance at the box plots of the streets in

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[240] Kam, *De sociaal economische verhoudingen*.
[241] P. Malcontent et. al. (eds.), *De lage wal zoekt het hoger op. De geschiedenis van de waalkade in Nijmegen* (Nijmegen 1989); J.R.A.M. Thijssen et. al. (eds.) *Een burgerfamilie in de Smidstraat 1760-1840* (Nijmegen 1984).

the wards of the *Lage Markt* and *Hezelstraat* show that the *Hezelstraat* only contains two streets which cannot be described as rather homogeneously poor. The ward of the *Lage Markt* is characterized by much more households in higher categories, and much more variation which is also takes shape in a higher Gini coefficient (table 6.1). The difference with Kam's conclusion may result from methodological differences, but may also reflect an actual change in the economic structure of the city on the level of wards. Kam's tax registers of 1682 probably exclude more poor people than the tax registers of 1694 central to this thesis. Only 911 households are recorded in 1682, versus 1483 taxpaying households in 1694.[242]

The number of entries representing exempt, but non-distinguished taxpayers per ward in 1694 may be used as an indicator of poverty in the city. The high percentage of non-taxpayers in the ward of the *Lage Markt* shown in table 6.2 indeed indicates that poverty in this ward is underestimated by an analysis based on taxpayers only. Almost no non-taxpaying households lived at the *Markt*, which was already identified as one of the most affluent wards above. Remarkable is the high share of exempt households in the ward of the *Burchtstraat*, which was identified as one of the most affluent wards as well. This ward seems to have housed many of the city's poorest households, as well as many wealthy families. The already comparatively high Gini coefficient in table 6.1, which is based on taxpayers only, thus probably underestimates differences within this ward.

The Gini coefficients for the taxpayers per ward also resemble one another, and vary between 0.52 and 0.66. Income inequality levels on the level of wards did thus resemble each other. Despite these small differences, the *Hezelstraat* stands out as the most homogeneous ward. The differences are less pronounced between the wards with the highest Gini coefficients, but the ward of the *Markt*, identified as one of the wealthiest, accounts for the highest Gini coefficient.

The conclusions with regard to economic affluence in the wards of Nijmegen adhere to the view initiated by Sjoberg that richer parts of the city are generally located in the centre, and poorer parts tend to be located in the periphery. Appendix D4 shows that the wards of the *Markt* was situated in the city centre, and the majority of the ward of the *Burchtstraat* as well. Large parts of the ward of the *Hezelstraat* covered the western peripheral area. The *Lage Markt* is also a peripherally located, adjacent to the *Hezelstraat*.[243]

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[242] Kam, *De sociaal economische verhoudingen*, 20.
[243] The map in appendix D4 is reconstructed by Gorissen, *Stede-atlas van Nijmegen*, 50.

Table 6.1 Gini coefficient per ward, in ascending order

SOURCE: RAN, *OAN*, inv. no. 2533.

Ward	Gini coefficient
Hezelstraat	0.52
Smidstraat	0.56
Broederstraat	0.59
Lage Markt	0.62
Grotestraat	0.64
Burchtstraat	0.65
Steenstraat	0.65
Markt	0.66

Table 6.2 Exempt, non-distinguished entries per ward, in ascending order of percentage of total number of entries

SOURCE: RAN, *OAN*, inv. no. 2533.

Ward	Number of entries of non-distinguished exempt households	% of non-distinguished, exempt entries of the total number of entries
Markt	2	1%
Broederstraat	8	3%
Smidstraat	5	3%
Hezelstraat	14	7%
Steenstraat	24	11%
Grotestraat	30	15%
Lage Markt	55	25%
Burchtstraat	62	28%

Segregation on the level of streets

On the level of streets, segregation was more pronounced, though not absolute. In general, streets with a comparatively high mean seem to be located in the middle of town on the two east to west axes, and in the area around and north from the large St Steven's church and the market.[244] This pattern corresponds to the generally drawn conclusion that residential segregation in early modern city tends to be characterized by a centre-periphery distinction.

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[244] Map D7.1.1 and D7.2.1.

Two streets instantly attract the attention on the maps visualising mean tax assessed per street. The *Duivengas* in the ward of the *Steenstraat* stands out as a street housing comparatively rich households only. These taxpayers paid between *f* 17.55 and *f* 46.40, although they did not belong to the top 30 taxpayers discussed below. The high mean tax levied on the *Varkensmarkt* in the ward of the *Broederstraat* also attracts attention, although map D7.2.2 and figure D1.2 show that the differences between the taxpayers were high. Both the *Duivengas* and the *Varkensmarkt* contained four taxpayers only, and just one additional household of a captain was mentioned at the *Varkensmarkt*. In Nijmegen, alleys were typically called 'gassen'. The *Duivengas* shows that the addition '-gas' does not necessarily mean that these small streets hosted poor people only. The *Pepergas* and *Jodengas* hosted high taxed households as well.[245]

Almost every street housed households from the lowest category. Only the minimum tax assessed was higher than *f* 1.80 in the *Duivengas*, the *Kerkhof*, and in the part of the street *Achter het Gasthuis* situated in the ward of the *Lage Markt*. The *Duivengas* has already been described as a small, comparatively rich and homogeneous street. In the other two streets, the minimum value did not exceed three guilders. It catches the eye that all four households recorded for the Kerkhof paid three guilders. According to Van Schevichaven, multiple houses on the *Kerkhof* were owned by the city council in the sixteenth and seventeenth century.[246] Unfortunately, the descriptions in the tax registers do not offer indications with regard to the inhabitants' livelihood.

The eight richest households and the 21 households in the category *f* 71.60 (the highest tax frequently imposed) lived scattered through town. Nevertheless, the *Houtstraat* hosted as much as five of the eight richest households, and one from tax category *f* 71.60. Map D7.2.2 clearly illustrates the high differences between households in this street. Exempt households were not reported in this street, which indicates the absolute destitute were not present. On the other hand, only 5 out of 28 households assessed in the lowest category paid their tax, suggesting that poverty was never far away.

The parcel sizes on the map of 1830 and the map of Feltman suggest that most of the rich families will have lived on the western side of the street. The *Houtstraat* can thus be identified as one of the most affluent streets of Nijmegen, in which the cities richest households lived opposite to rather poor families. Pictures resembling the photographs of Johnny Millers in the Introduction come to mind.

Traditionally, the *Ridderstraat* and eastern part of the *Burchtstraat* (this is the part called '*Grote Burchtstraat*' in the tax registers) are seen as the most affluent and distinguished parts of medieval and early modern Nijmegen.[247] These streets still housed some of the richest families in 1694, but the

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[245] The presence of highly taxed households and a large diversity of taxpayers in the Pepergas is confirmed by Clevis' research on tax levied in 1422/23: Clevis, *Nijmegen: Investigations into the historical topography*, 421.
[246] Van Schevichaven, *Straten, markten, pleinen*, 300-302.
[247] Lemmens, *Nijmegen in 1669*, 21; specifically about the 15th century: Clevis, *Nijmegen: Investigations into the historical topography*, 493.

tax registers reveal that the more western situated *Houtstraat* should be added to the list of exceptionally affluent streets in Nijmegen around 1694.

Next to the *Grote Burchtstraat*, the *Grotestraat* stands out in housing multiple of the richest households. The presence of rich households in these streets is reflected in map D7.1.1. This finding is reflected in research of Clevis on the *Grotestraat* during the fifteenth and early sixteenth century.[248] For the *Grote Burchtstraat*, the painting of Feltman and the parcels on the map of 1830 indicate that the more affluent households probably mainly lived on the southern side of the street. For the *Grotestraat*, a distinction between sides of the street is not clearly visible, but Clevis showed that the western side of the street was probably the more prosperous side, especially the part between the *Pepergas* and *Burchtstraat*. Map D7.1.2 indicates that inequality on income in these streets was rather high in 1694. For the fifteenth and early sixteenth century, the *Grotestraat* was also inhabited by households of different economic means. Clevis also observed a great variety of professions during the early fifteenth century.

Inequality was also high in the *Ridderstraat*, and to a lesser extent in the *Muchterstraat* and *Broederstraat*. The *Ridderstraat* stands out most: it hosted three households paying *f* 71.60, whereas 75% of the taxpaying households was assessed less than the small sum of *f* 5.25. The southern side of the street seems, similarly to the *Grote Burchtstraat*, the more affluent side. The affluent character of the street as a whole is exemplified by the lack of exempt households, with the exception of one distinguished household. Slightly more than half of the taxpayers in the street, however, did not pay their tax.

Table 6.3 Geographical distribution of the eight richest households
SOURCE: RAN, *OAN*, inv. no. 2533.

Category	Number of households	Streets
f 133.00	1	Lage Markt
f 110.00	1	Grote Burchtstraat
f 100.00	2	Houtstraat; Hezelstraat (ward of the Hezelstraat)
f 96.50	1	Jodengas
f 87.50	1	Houtstraat
f 80.00	2	Houtstraat

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[248] With regard to Clevis' research, this paragraph has been based on: Clevis, *Nijmegen. Investigations into the historical topography*, 397-409.

Table 6.4 Geographical distribution of the tax payers in the top category *f* 71.60

SOURCE: RAN, *OAN*, inv. no. 2533.

Number of households	Street
4	Grote Burchtstraat
4	Grotestraat (ward of the Grotestraat)
3	Ridderstraat
2	Broederstraat
2	Muchterstraat
1	Ganzenheuvel en Brouwerstraat
1	Houtstraat
1	Korenmarkt (ward of the Smidstraat)
1	Priemstraat
1	St. Jooststraat
1	Varkensmarkt

Vance expected that the more well-to-do in sixteenth- and seventeenth-century northern European cities would change their living places in the city centre for more favourable, newly created spots outside the commercial centre. This shift could not be confirmed by the survey of Lesger and Van Leeuwen on residential patterns in early modern European cities.[249] The continuation of the *Burchtstraat* and *Ridderstraat* as distinguished, affluent streets at least well into the seventeenth century indicates that Nijmegen adheres to this general pattern as well.

However, simultaneously, some characteristically prosperous residences were built in the eastern and western corners of the city during the seventeenth century. The Doddendaal House, also called the Palstercamp House, was finished in the south-western corner of the city in 1669 (figure 6.2).[250] The impressive residence of Sweder van Boetselaer in the south-east was finished around the same time (figure 6.3). The nearby house of secretary Jacob Leeuwens (figure 6.4) also stands out.[251] As will be discussed below, these residences were surrounded by significantly less well-off households.

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[249] Lesger, Van Leeuwen, 'Residential segregation', 342.
[250] Lemmens, *Nijmegen in 1669*, 33.
[251] Lemmens, *Nijmegen in 1669*, 19.

In addition to these eye-catching residences, summer houses with a large garden in the *Regulierstraat* were probably in favour by the well-off during the seventeenth and eighteenth century.[252] These summer houses cannot be traced back in the tax registers, but the number of parcels on the map of 1830 and the number of houses on the map of Feltman compared with the number of taxpayers in the register of 1694 admits the possible existence of these houses around this time. This indicates that some rich families favoured a residence with a large garden in a more tranquil environment.

Figure 6.3 The residence built by order of Sweder van Boetselaer, SOURCE: Map of Feltman.

The *Regulierstraat* was not a street of paupers, but its taxpayers cannot be characterized as affluent neither. Only one exempt household could be found in this street, but twenty-five households belonged to the lowest tax category. Only one additional household was supposed to pay a slightly higher sum of *f* 3.00. This household and only two others paid their tax. The map of Feltman indicates that richer houses were probably situated on the north-eastern side of the street. Again, this indicates that ordinary, rather poor households and well-off families often lived across one another in Nijmegen. A rich peripheral sphere as Vance envisioned is thus out of the question.

Figure 6.2 Doddendaal, or the Palstercamp House, built in 1669. SOURCE: Map of Feltman.

Poor streets are more easily identifiable than affluent streets. Six streets only hosted taxpayers from the lowest category of *f* 1.80. Two of them stand out because of the many households living in these streets: the *Vlaamse Gas* and, in the same south-eastern corner of town, the part of the *Ziekerstraat* belonging to the ward of the *Ziekerstraat*. As many as twenty streets contained only taxpaying households from the categories *f* 1.80 up and including *f* 3.50. The high number of poor people in the city is reflected in the high number of low income streets. Entries explicitly referring to 'poor people' all belong to streets identified as poor based on the taxpayers who did live there.

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[252] Lemmens, *Nijmegen in 1669*, 33.

These streets were located in the centre of town as well as in the peripheral areas. Except from the houses nearby the *Hoenderpoort*, these poor streets did not belong to the main axes of the city. Along the main axes from the *Molenpoort* to the *Kraanpoort*, and from the *Hoenderpoort* to the *Hezelpoort*, mean values and inequality on income were generally high. The houses nearby the *Hoenderpoort* were located behind the city's bleach field. This was could be identified as the peripheral corner of town. In 1639, for example, one of the houses in this corner became a hospital for leprosy sufferers.[253] From ca. 1650 onwards, this building was used as a hospice for less affluent transients and vagrants.[254]

The spatial distribution of non-taxpayers over town may provide additional information on the poorest streets. The *Grotegas*, *Schapengas*, and *Praatshof* did not contain taxpayers at all. These streets are located next to each other. Moreover, the nearby *Keumegas* contained eight exempt households, and one households which was supposed to pay *f* 1.80. These streets formed one of the clusters of poor streets in Nijmegen.

Two streets stand out because of their high number of exempt households: the *Hertogsteeg* with 3 exempt military households and 29 other exempt households next to 18 taxpayers, and the *St Jooststraat* with 1 military households and 16 other exempt households next to 9 taxpayers. These are adjacent streets in the south-eastern corner of the city. Based on the mean tax paid, the *St Jooststraat* appears to be comparatively affluent. However, this is caused by one rich household assessed at *f* 71.60. The corresponding building is easily identified on the map of Feltman, although it might have looked differently in 1694 (figure 6.4).

Figure 6.4 The house of secretary Jacob Leeuwens in the *St Jooststraat*. SOURCE: RAN, *OAN*, inv. no. 2533 (1694); Map of Feltman.

The *Hertogsteeg* joined one of the four land gates of the city. The other land gate in the eastern part of town, the *Hoenderpoort*, also joined onto a poor street. In general, the mean tax paid along the main axes of Nijmegen was higher, but the simultaneously high Gini coefficients suggest large

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[253] Van Schevichaven, *Straten, markten, pleinen*, 2.
[254] A.M. Postel, 'De handelsstad wordt vesting. 1568-1815', in: Malcontent, *De lage wal zoekt het hoger op*, 8-14, q.v. 12.

differences between the residents. The boxplot of the *Molenstraat* and the maps indicate that the *Molenstraat* was less affluent than the more centrally located *Broederstraat* and *Grotestraat*, but it cannot be characterized as a poor street either. The box plot shows that fifty percent of the taxpaying households were supposed to pay a tax between *f* 1.80 and *f* 5.00, and the richest household paid *f* 30.00. Figure 6.5 provides a visual impression of the *Molenstraat* seen from the *Wiemelpoort* or *Windmolenpoort* situated between the *Molenstraat* and *Broederstraat*.

Figure 6.5 *Molenstraat*. Ink drawing by Feltman, ca. 1647/1648?
SOURCE: Lemmens, *Nijmegen in 1669*, 8.
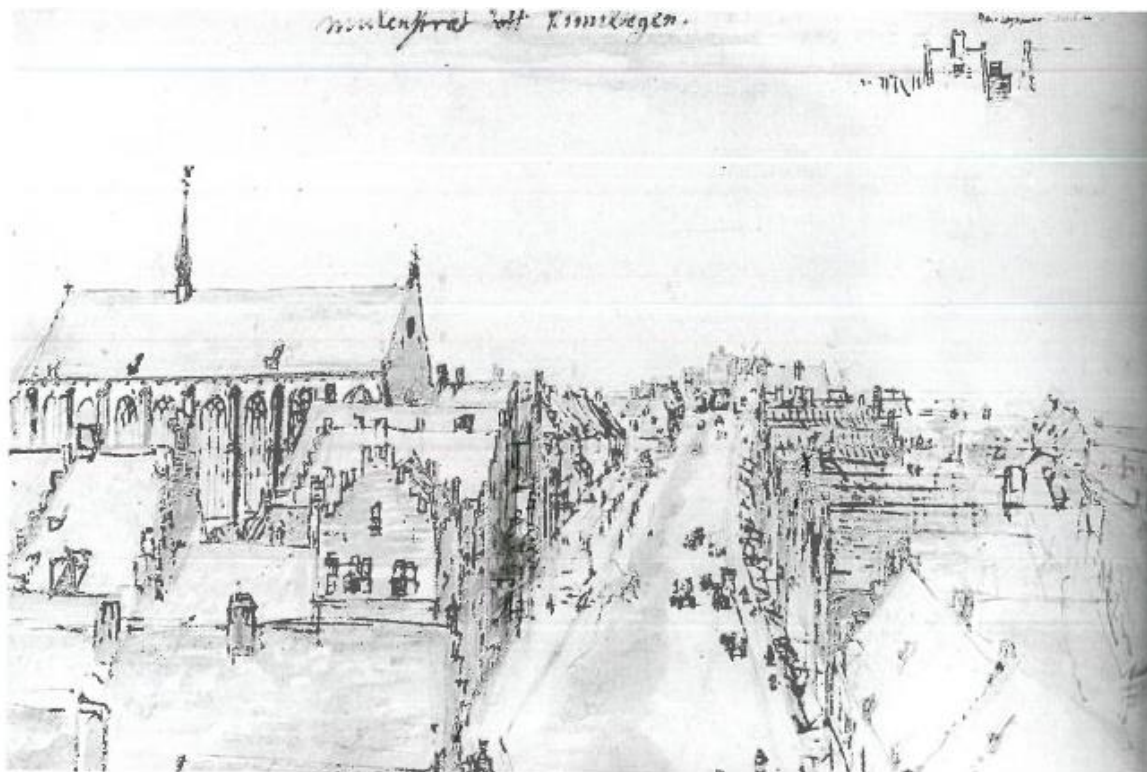
The *Hezelstraat* was the other main access road into the city from land. The *Hezelstraat* resembles the *Molenstraat* in economic affluence and inequality. The maximum tax assess also approximates thirty guilders, with the exception of one household assessed for *f* 95.00. An ink drawing of Feltman clearly shows stalls before houses in the part of the street situated between the *Jodengas* and *Houtstraat*.[255] This may illustrate a retail function of the *Hezelstraat*. For retailers, main access roads guaranteed the passing-by of the city's guests and inhabitants. The *Grotestraat*, a main access road from the river Waal into the city, seemed to have had a similar function in the fifteenth and early sixteenth century.[256]

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[255] Clevis, *Nijmegen: Investigations into the historical topography*, 287.
[256] Ibidem, 397-409.

Figure 6.6 *Hezelstraat*, part which joins onto the main market. Ink drawing by Feltman ca. 1647/1648? SOURCE: Lemmens, *Nijmegen in 1669*, 25.
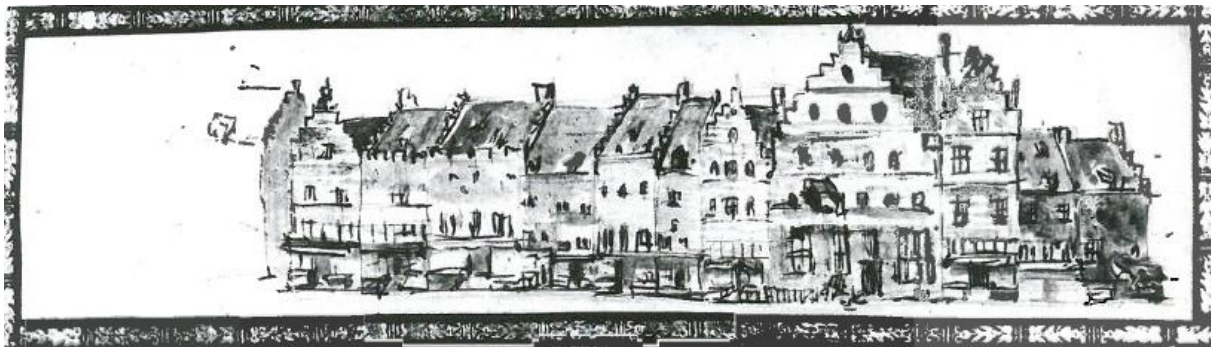
In the historiography of Nijmegen, differences in altitude are seen as an important factor of influence on the locations of residences of more affluent households and the city's poor. Low-lying houses, especially those near the river Waal, frequently ran the risk of being flood. The residences of more affluent households were therefore located above the flooding level. Nearby the river Waal, residences above the gates could belong to distinguished inhabitants.[257]

Appendix D3 shows a contemporary contour map.[258] The wealthiest streets of 1694 are indeed located in the red and orange parts of the contour map. Near the river Waal, the buildings around the former location of the *Kraanpoort*, the main access gate from the Waal quay into the city, were located slightly higher than other houses near the river. This might be the reason why the mean values for the *Grotestraat*, *Lage Markt*, and *Aan het water* are higher compared to the surrounding streets near the water. The *Haven* and the streets south of the *Haven* are indeed located approximately three meters lower. The *Haven* hosted people from the lowest category only, except from one household paying the modest sum of *ƒ* 2.00, and one exceptional household of a lieutenant assessed for *ƒ* 32.60.

Within the *Grotestraat*, *Lage Markt* and *Aan het water*, there was much diversity between the households' incomes. Potential segregation within streets is difficult to observe based on the tax register only. Nevertheless, the map of Feltman and the map of 1830 both indicate that larger parcels were located on the south side of the *Lage Markt*, which might have been located slightly higher. Between the *Veerpoort* and the *Kraanpoort* (the eastern side of the quay), many building concerning shipping were probably located, such as rope-makers and warehouses.[259] In the tax registers, there are some indications that people concerned with harbour activities lived in the streets surrounding the harbour. Two sack porters who failed to pay their tax can be identified in the *Steenstraat*, the harbour

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[257] A.M. Postel, 'Oever en Werf. Romeinse tijd – 1568', in: Malcontent et. al, *De lage wal zoekt het hoger op*, 2-7, q.v. 5, 6.

[258] Visit http://nl-nl.topographic-map.com/places/Nijmegen-8985461/ to study the differences in altitude in more detail (27 April 2017).

[259] Postel, 'De handelsstad wordt vesting', 12.

master, assessed for ƒ 1.80, lived in the harbour in proximity to the family of Matthijs Coenen, 'commissioner of packages', who was mentioned in chapter 4.

For streets divided between two different wards, information is available for sides of the street opposite each other. Generally, the mean values and Gini coefficients resemble one another, for example in the *Grotestraat* and *Hezelstraat*. The *Grotestraat* and *Hezelstraat* are two roads uphill. The high income differences within this street may have been related to differences in altitude.

Based on tax registers of 1422/23 and town accounts, Clevis was able to study the *Grotestraat* in more detail. He noticed that the part between the *Pepergas* and *Burchtstraat* could be identified as the most fashionable part of the street. This is the higher located part of the street, closest to the main market. Multiple political dignitaries lived in the *Grotestraat*; most of them in this part. During the fifteenth and early sixteenth century, many of Nijmegen's taverns and inns were probably situated in the *Grotestraat*, since this was the main access road from the river Waal into the city. Most of these taverns were situated in the segment between the *Pepergas* and *Burchtstraat*, including those frequently visited by political dignitaries. Differences in altitude and proximity to the city centre thus seem to have played a role, but conclusions should be drawn carefully. Households paying a high tax in 1422/23 were found in all parts of the *Grotestraat*.[260]

Some indications of differences between opposite sides of streets, based on parcel sizes, have already been mentioned. This 'opposite street segregation' is also indicated by the tax data from the *Ziekerstraat*. The Gini for the *Grotestraat*-ward side (the 'left' side) of the street is high in contrast to the other side. A closer look at the data reveals that indeed some households of a modestly higher income, and one exceptional household assed for ƒ 17.00, lived on the *Grotestraat*-ward side of the street. Especially the *Grote Burchtstraat* and *Ridderstraat* discussed above, housing high income households opposite to low income families, suggest that panorama may not have been a decisive factor of influence on the living places of most of Nijmegen's richer households.

The maps visualizing mean tax assessed and inequality within streets indicate that inequality was comparatively high in high income streets. Figure 6.7 shows the Gini coefficient (an indicator for economic inequality) as a function of mean tax assessed (an indicator for economic affluence in a street). The figure clearly shows a correlation between economic welfare in a street and income inequality. To quantify this correlation, a trend line is fitted through the distribution excluding four outliers that will be discussed below. The distribution is surprisingly well described by the function y = 0.255 (x -1.8)$^{0.41}$.[261] Excluding the four outliers, the coefficient of determination (r^2), a measure for the variation between the observed data and the data predicted by the fit, approximates 0.90. The

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[260] Clevis, *Nijmegen. Investigations into the historical topography*, 397-409.
[261] My thanks are due to Remko Logemann for assisting me in determining this function.

coefficient of determination may vary between zero and one; a value of one representing a perfect fit. The two outmost outliers fall outside the range of the fit, but the coefficient of determination including the two outliers closest to the fit approximates 0.83. The definition of the coefficient of determination used reads as follows:

$$r^2 = 1 - \frac{\sum_i (y_i - \hat{y}_i)^2}{\sum_i (y_i - \bar{y})^2}$$

With y_i being the observed y values, $\hat{y}_i$ the values predicted by the fit, and $\bar{y}$ the mean.

Figure 6.7 Scatter plot of indicators of economic affluence (mean tax assessed) and inequality (Gini coefficient) in streets of at least three taxpaying households. Each dot represents a street in a ward of corresponding colour. SOURCE: RAN, *OAN*, inv. no. 2533.
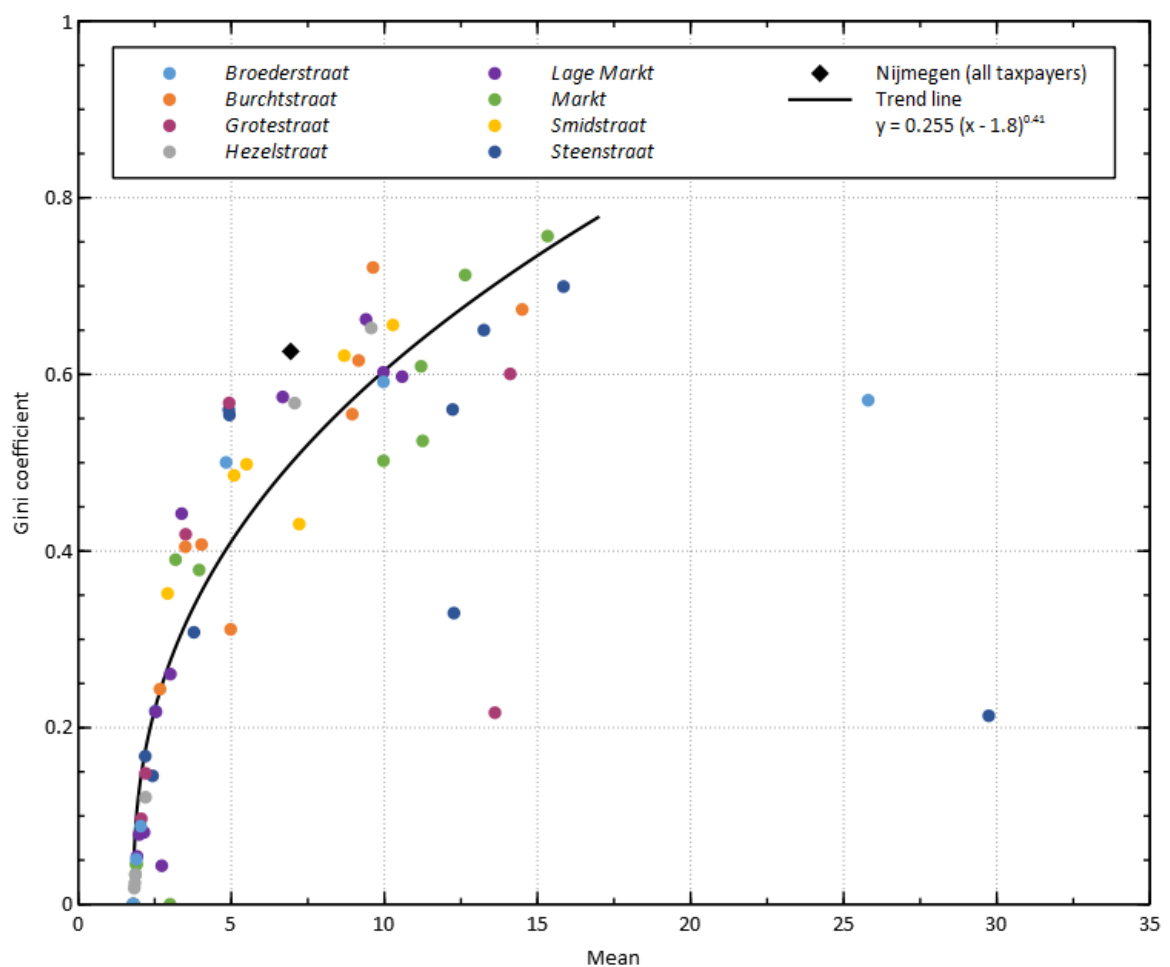
Dispersion of low income streets is small compared to high income streets. The figure indicates that economic homogeneity increases if mean economic affluence in a street decreases. In other words, homogeneously poor streets are a common phenomenon, but homogeneously rich streets are rare. On the level of wards, the highest inequality level was observed in the wealthiest ward, whereas

comparatively little inequality was observed in the poorest ward of the *Hezelstraat*, hinting at a similar relation of financial affluence and income inequality.

Only four streets in Nijmegen are outliers in this pattern. These are, in sequence of ascending mean, *Het Hof*, *Achter het Gasthuis* (in the ward of the *Grotestraat*), *Varkensmarkt*, and *Duivengas*. These are very small streets of 3-4 taxpaying households. The *Duivengas*, *Varkensmarkt* and this part of *Achter het Gasthuis* have already been described as exceptional streets in Nijmegen. *Het Hof*, being a castle, is an exceptional building in the city. The exceptional composition of households in this area may thus not come as a surprise. The tax register mentions the viscount, exempt from paying tax, a household consisting of three members of the better well-off Roukens family, the household of one of the city's aldermen, and the low-assessed gate-keeper.

The black diamond indicates the mean value and Gini coefficient for tax-paying Nijmegen as a whole. Figure 6.7 clarifies internal differentiation in the city. Inequality levels in the vast majority of streets were lower than inequality in the city as a whole. Chapter 5 showed that inequality levels on the city level are very much alike in early modern cities. Comparing internal differences between cities may contribute to the explanation of the development of early modern economic inequality.

Residential patterns for particular social groups

The general analysis of residential segregation on the level of wards and streets in Nijmegen may be supplemented with an analysis of the living place of particular social groups. A modestly more detailed description of residential segregation in Nijmegen will be provided by looking at four groups that are easily distinguishable in the tax registers: members of the city council, the masters of the wards, military households, and Jews.

Members of the city council

In January 1694, two mayors and ten aldermen were appointed as the city council. Seven of them had to pay *f* 71.60, the others were placed in lower categories. The lowest tax was paid by Hendrick Frederick Verbolt, who had to pay *f* 15.00. Consistent with the observed spread of wealth over the city, almost no members of the city council were found in the same street. Only the *Grote Burchtstraat* housed three of them, who were all assessed for *f* 71.60. All members of the city council were found in comparatively wealthy streets which were part of the main axes. Only the *Ganzenheuvel en Brouwerstraat* could be identified as a side-street, but the Reinders family may as well have lived on the square adjacent to the main axis *Hezelstraat-Burchtstraat*, in which case they would have adhered to the pattern.

The town hall was found in the *Korte Burchtstraat*, in line with the *Grote Burchtstraat* and the central market ('*Markt*'). Proximity to important religious and governmental buildings such as the town hall was suggested by Sjoberg as a decisive factor in the places where the city's elite took up residence. It is questionable whether there is a causal relation between the location of the town hall and the proximity of the residences of its council members in Nijmegen. The town hall, located in the city centre, lies within convenient walking distance from every possible location within the walls. Building history, prominent premises which were already present, will at least partly have influenced the living place of these more well-to-do. In addition, the main axes may have been attractive to these households, since they guaranteed the visibility of the families by many passers-by.

Table 6.5 Living place and assessed tax of members of the city council of Nijmegen in 1694
SOURCE: RAN, *OAN*, inv. no. 122 fol. 15 (21 January 1694), inv. no. 2533.

Mayors:		
François Verbolt	Houtstraat	ƒ 71.60
Hendrick Kuper	Ridderstraat	ƒ 71.60
Aldermen:		
Nicolaes Fagel[262]	Grote Burchtstraat	ƒ 71.60
Jacob Roukens	Hezelstraat	ƒ 36.00
Justinus de Beijer[263]	Grote Burchtstraat	ƒ 71.60
Francois van Heuckelom	Broederstraat	ƒ 46.00
Willem Reinders	Ganzenheuvel en Brouwerstraat	ƒ 71.60
Godert van de Wall	Markt	ƒ 22.40
Hermannus Heijsen	Muchterstraat	ƒ 48.20
Peter Beeckman[264]	Ridderstraat	ƒ 71.60
Hendrick Frederick Verbolt	Het Hof	ƒ 15.00
Johannes Ingenool	Grote Burchtstraat	ƒ 71.60

Hopmannen – the masters of the wards

The tax registers enable us to extend our knowledge about the masters of Nijmegen's wards, the so-called 'hopmannen'. Table 6.6 shows that they did not always live in the ward they coordinated. Their

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[262] Fagel was appointed as alderman in January 1694, but named a mayor in the tax register of 1694. The tax register mentions his widow, so he passed away in 1694. He was replaced by Johan van Leeuwen in January 1695: RAN, *OAN*, inv.no. 122, fol. 177 (2 January 1695).
[263] De Beijer was appointed as alderman in January 1694, but named a mayor in the tax register of 1694.
[264] Beeckman was appointed as alderman in January 1694, but named a mayor in the tax register of 1694.

taxes show that they belonged to the economic elite of the city. The tax paid by Peter de Graeff, who coordinated the ward of the *Burchtstraat*, paid a low tax of five guilders compared to the taxes of the others. Their involvement in the city's government is also shown by additional information in the tax register. Godert van de Wal and Hermanus Heijsen were not only masters of wards, but also aldermen in the city council. Johan Verbolt and Wilhelm van Loon were both described as secretaries.

Table 6.6 Masters of the wards in Nijmegen in 1694

SOURCE: RAN *OAN*, inv. no. 2533.

Name	Ward of function	Ward of residence	Street of residence	Tax assessed
Peter van de Graeff	Burchtstraat	Burchtstraat	Grote Burchtstraat	ƒ 5.00
Godart van de Wal	Markt	Markt	Markt	ƒ 22.40
Johan Verbolt	Hezelstraat	Steenstraat	Ridderstraat	ƒ 25.00
Christoffel van den Bergh	Grotestraat	Grotestraat	Grotestraat	ƒ 36.00
Hermanus Heijsen	Broederstraat	Steenstraat	Muchterstraat	ƒ 48.20
Johan van Leeuwen	Smidstraat	Grotestraat	Grotestraat	ƒ 71.60
Peter Jordaen	Steenstraat	Steenstraat	Muchterstraat	ƒ 71.60
Wilhelm van Loon	Lage Markt	Lage Markt	Lage Markt	ƒ 71.60

Military households

During the seventeenth century, the garrison left its mark on Nijmegen. The large group of soldiers will have influenced Nijmegen's businesses and street scene to a large extent, which presents the question where they typically lived. Soldiers did not pay tax, but were mentioned in the tax registers.

Chapter 4 already discussed that many of the militaries may have stayed with private families. The tax register of 1694 reveals that as many as eight houses with soldiers were situated in the *Boddelstraat* in the north-eastern corner of the street. This is a street bordering the wall and leading to the harbour. The *Kloosterhof*, a side street of the *Boddelstraat*, contained three more soldiers-houses. These are the only 'houses with soldiers' mentioned in the source, which suggests that soldiers without a family mainly lived in this peripheral corner of the city.

A former cloister in this area functioned as barracks for several years in the seventeenth century. In 1694, the building possibly served a different function.[265] We may typify the cluster of buildings

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[265] https://www.huisvandenijmeegsegeschiedenis.nl/info/Klooster_%E2%80%9CDal_van_Josaphat%E2%80%9D (01 May 2017); Lemmens, *Nijmegen in 1669*, 27.

which did house militaries in 1694 as precursors of the barracks which were specifically built to house militaries. This 'military area' also housed other households, which paid low taxes only except for one households paying ƒ 18.00. Two other soldiers, each individually named as 'soldier' in the register, lived in the *Hertogsteeg*. This street was characterized earlier in this chapter as one of the poorest streets of the city.

Military men of higher rank than 'soldiers' were found scattered through town. The one paying the highest tax lived in the *Haven* (the harbour), which bordered the *Boddelstraat* and *Kloosterhof*. Lieutenant Peter van Sughtele had to pay ƒ 32.60. He was surrounded by households assessed for ƒ 1.80. This indicates a relation between his living place and his military function.

In the *Schapengas*, *Grotegas*, *Praatshof*, and *Papegas*, four entries mention 'soldiers women'. These streets belonged to Nijmegen's poorest alleys, all located in proximity to one another in the north-eastern part of the city, close to the buildings with soldiers. Possibly, these are women who had come along with the soldiers. Many marriages of soldiers in seventeenth-century Nijmegen are recorded.[266] *Praatshof*, *Schapegas*, and *Grotegas* were three small alleys behind each other. Taxpayers did not live in the *Praatshof*, *Grotegas* and *Schapegas*, and only four of twelve entries in the *Papegas* concerned taxpayers. Soldiers and so-called 'soldiers women' thus typically lived in the poorest parts of the town.

Jews

In many cities, Jews were forced to live in specific parts of the city. Even if they were not forced, Jews were one of the groups which often clustered together, such as in Amsterdam.[267] Although the street names *Jodengas* ('Jew alley') and *Jodenberg* ('Jew hill') may suggest otherwise, Jews were not compelled to live in pre-determined areas in Nijmegen neither.[268]

The tax ledgers do not consistently register the religion of the households. However, we may obtain a first impression of the living places of Jews by selecting typically Jewish names and references to Jews. Table 6.7 shows the descriptions of seven households which can be identified as Jewish. All of them lived in the northern part of the city, in streets which were a continuation of one another. At least for the *Nonnenstraat*, *Ganzenheuvel* en *Brouwerstraat*, and *Grotestraat*, there are indications in the tax registers that non-Jewish families lived there as well. Those living in the *Vleeshouwerstraat* paid a low tax. Although the others did not pay very high taxes neither, their taxes exceeded those of at least 67% of Nijmegen's taxpaying households. The sums reflect the internal differentiation in this group discussed in chapter 5.1.

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[266] Engelen, *Nijmegen in de zeventiende eeuw*, 13; Engelen, 'Leven en dood', 310-311.
[267] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 109.
[268] Van Schevichaven, *Straten, markten, pleinen*, 66, 69.

Table 6.7 Jewish households in Nijmegen in 1694

SOURCE: Register of *Familiegeld*, *OAN*, inv. no. 2533.

Name	Street	Tax assessed
Bernt Alsche Joode	Vleeshouwerstraat	ƒ 1.80
Lasarus Davids Joode	Vleeshouwerstraat	ƒ 1.80
Moses Mordachai Joode	Vleeshouwerstraat	ƒ 1.80
Eleasar Salamons Jood	Nonnenstraat	ƒ 3.50
David den Jood	Nonnenstraat	ƒ 3.50
Jacob Oppenheim Joode	Ganzenheuvel en Brouwerstraat	ƒ 6.00
Salamon den Jood	Grotestraat (ward of the Grotestraat)	ƒ 12.00

6.2.4 Residential segregation in Nijmegen in a Netherlandish perspective

Chapter 5 showed that differences in economic means between households were generally high in early modern cities. The majority was formed by rather poor people. The income distribution reflected in Nijmegen's tax registers and a high Gini coefficient confirmed Nijmegen's adherence to this pattern. This chapter showed the reflection of these high inequality levels in residential patterns. Poor households were found everywhere in the city. Moreover, many homogeneously poor streets existed. This subsection will compare residential patterns in Nijmegen to those in other Netherlandish cities. Due to the limited availability of data on some of these cities, not all cities discussed in section 1 will be discussed to the same extent.

In general, the periphery of Nijmegen was characterized by less affluent households, and the well-off resided in the centre of the city. On the level of wards as well as on the level of streets, Nijmegen thereby adheres to a perceived central-periphery pattern in early modern cities – a model initiated by Sjoberg. Sjoberg considered the wish for centrality the main reason for this pattern. He characterized the city-centre as a low risk area where the most important institutions were located. Moreover, the vicinity of people one was involved with was favoured in a time walking was the norm and carriages were limited to the city's elite.

For Nijmegen, risk assessment seems to have been a determinative factor in residential patterns. The well-off favoured higher located buildings, because of the danger of flooding in lower parts of the city. Differences in altitude thus stimulated residential segregation in Nijmegen. In the other

Netherlandish cities discussed, differences in altitude were negligible.[269] Nevertheless, many similarities been residential patterns in these cities can be discerned.

Main axes generally housed the most affluent inhabitants. This pattern is visible on maps visualising the geographical distribution of economic affluence in early modern Nijmegen, Kortrijk, Gent, Delft, Alkmaar and Amsterdam. In Nijmegen, it has been observed that parts of main access roads joining onto land gates, were less affluent than more centrally located parts. A similar pattern is discernible in Alkmaar, Amsterdam, Gent, and to a lesser extent in Kortrijk.[270]

So-called 'around the corner segregation' could be discerned in all cities. Larger streets generally housed more affluent households than side-streets. Exceptions prove the rule: in Nijmegen the *Duivengas* stands out as a homogeneously rich side-street.

In Nijmegen, it has been observed that the main access roads, particularly the *Hezelstraat* and *Grotestraat*, probably housed a significant part of the city's retail traders. This should be seen as a preliminary conclusion, since this thesis does not focus on the professional structure of the city. Lesger also emphasized the importance of access roads for retailers in Amsterdam.[271] Vanneste studied this aspect in more detail for Gent and Kortrijk. She mentioned that retail trade, taverns and inns in Gent were typically located in the old medieval centre, and near water ways used for supplies. For Kortrijk, retail traders, taverns and inns are not identifiable in Vanneste's analysis.[272] The importance of access roads in providing accessibility (for both customers and supplies) and visibility for (retail) traders adheres to Vance's models of residential patterns in medieval, and particularly early modern cities.

Both Vanneste and Lesger and Van Leeuwen argued that the largest city in their test case showed a clearer pattern of residential segregation than the smaller cities. For Vanneste, this applied to the larger Flemish city of Gent and the smaller Flemish city of Kortrijk; for Lesger and Van Leeuwen to the large city of Amsterdam and the smaller cities of Alkmaar and Delft in Holland. Vanneste's method allowed her to conclude that social-economic differentiation in Kortrijk's streets was usually higher than in Gent. Small, central zones with a clear structure, on the other hand, were only found in Gent. Lesger and Van Leeuwen compared the distribution of house rents in the large city of Amsterdam to the distribution of rental values in the smaller cities of Alkmaar and Delft in Holland. They only offered an indicator for internal differentiation for Amsterdam. As discussed in paragraph 6.1.3, it is impossible to compare between segregation levels in different cities unless commensurable geographical units

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[269] Vanneste, *De pre-industriële stad*, 183; Lesger, Van Leeuwen, 'Residential segregation', 368; http://nl-nl.topographic-map.com/places/'s-Hertogenbosch-6652262/ (4 May 2017); http://nl-nl.topographic-map.com/places/Leiden-7874575/ (4 May 2017).

[270] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 113, 127; Vanneste, *De pre-industriële Vlaamse stad*, 115.

[271] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 126-128.

[272] Vanneste, *De pre-industriële stad*, 141-144, 158-168.

and measures are taken as a starting point. For this reason, a comparison of the extent of segregation in Nijmegen to the extent of segregation in the other Netherlandish cities under discussion falls outside the scope of this thesis.

Next to around the corner segregation, opposite street segregation could be observed in Nijmegen based on a visual analysis of parcel sizes and sizes of houses on Feltman's map of 1669. This applied to streets of different economic character. For example, in the *Ridderstraat*, the richest households of the city lived across households from the lowest tax category who could not afford to pay. In the less affluent *Ziekerstraat* a distinction between opposite sides is visible as well. The maps of Alkmaar and Delft suggest that this form of segregation also existed in these cities. To a lesser extent, it is also observable in Amsterdam, for example in the *Herengracht*.[273]

This high frequency of 'opposite street segregation' could be an indication that panorama usually played an inferior role in determining ones living place in Nijmegen, Alkmaar and Delft. Building history may have been more determinative. For Nijmegen, it is known that streets housing some of the most affluent households, such as the *Burchtstraat* and *Ridderstraat*, had a tradition of housing upper-class families. Most of these streets may be characterized as main streets. The spacious character of these streets and high number of passers-by may have contributed to the status of their residences.

Vance expected the well-off to search for more spacious and tranquil places to live within the city during the seventeenth century. According to Lesger and Van Leeuwen, this pattern has not been observed for early modern cities yet. However, the existence of summer houses and the creation of several impressive building with large gardens in the peripheral areas of Nijmegen during the seventeenth century suggests an appreciation of space and new, green spots among Nijmegen's economic elite. With regard to panorama, these spots offer larger gardens and more 'green' than those within the city centre, but the houses in their vicinity were often rather poor.

The studies of Alkmaar, Delft, and Amsterdam show the determinative influence of canals on residential patterns in cities in Holland. In Amsterdam, highest rents were paid along the main canals. These canals may have served as a tranquil area with a preferable panorama just outside the city centre from the seventeenth century onwards. Less rich but still affluent houses were situated along second-rate canals, whereas side streets of these canals housed less well-off.[274] In Alkmaar and Delft, main canals also mainly housed the 25% richest families. In Delft, a clear difference in economic affluence is visible between main canals and second-rate canals. In both cities, canals will have offered a panoramic view favoured by the economic elite.[275] For Gent, the relation between inner-city water ways and

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[273] Lesger, Van Leeuwen, 'Residential segregation', 349-351, 353; Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 111, 113.

[274] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 114-117, 113, 119, 122.

[275] Lesger, Van Leeuwen, 'Residential segregation', 349-353, 356.

house rents is less obvious. Houses from all clusters were found along the water. The same holds true for Kortrijk.[276]

The presence of multiple canals is typical for cities in Holland. Canals are also present in other Netherlandish cities, but not in all of them, and usually to a lesser extent. The rectilinear street pattern of these cities in Holland as a result of canals stands out with regard to street patterns in the other cities under investigation. Residential patterns in cities in Holland are thus not illustrative for cities in the Dutch Republic in general, but underlying motivations for housing choices, such as tranquillity, space and accessibility may have been the same.

Figure 6.7 showed a correlation between economic affluence and inequality in streets in Nijmegen. Affluent streets generally housed families of more diverse economic means than poorer streets. Many homogeneously poor streets existed, but homogeneously rich streets were an exception. For mid-sixteenth-century 's-Hertogenbosch, Blondé observed a similar pattern.[277] However, the study of Lesger, Van Leeuwen and Vissers on early-nineteenth century Amsterdam suggests a reverse relation. Differences between families in rich neighbourhoods were small. In most poor, and less affluent but not poor neighbourhoods, differences were high.[278]

Future research should determine whether these opposite observations are due to differences in character of these cities, or to methodology. For example, Amsterdam was a much larger city than 's-Hertogenbosch and Nijmegen, and economic inequality in the city as a whole was much larger. With regard to methodology, both Blondé and I have taken streets as a starting point. Lesger, Van Leeuwen and Vissers calculated the coefficient of variance of all houses within cells of an artificial grid of 50 by 50 meters. The orientation of this grid does not become clear from the figure. Variance in economic means of people such a cell may differ from variance between people in the same street. Around the corner segregation has influenced the outcome of measured differentiation in the method of Lesger, Van Leeuwen and Vissers, whereas Blondé and my approach captured differences between sides of streets in both longitude and latitude in the levels of inequality measured.

6.3 Interim conclusion

In contrast to the study of the development of economic inequality, standard approaches and measures have not yet been developed in the study of residential segregation levels in early modern cities. The test case of Netherlandish cities exemplified this lack of methodological unity, which hampers the study of residential segregation and economic inequality on the city level in relation to

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[276] Vanneste, *De pre-industriële Vlaamse stad*, 111, 115.
[277] Blondé, *De sociale structuren*, 91.
[278] Lesger, Van Leeuwen, Vissers, 'Residentiële segregatie', 118, 113.

each other. An alternative way to compare residential segregation levels in early modern cities has been proposed for the future in order to stimulate this type of research. It fell outside the scope and abilities of this thesis to apply this approach on the test case of Netherlandish cities.

The case study of Nijmegen not only illuminates residential patterns which add to our understanding of this city itself, but also showed the possible value of studying economic inequality on the city level in relation to internal differences. Figure 6.7 visualized internal differences on the street level in relation to the Gini coefficient for Nijmegen as a whole. Understanding of differences in internal variation of economic inequality in cities may contribute to our understanding of the development of economic inequality in early modern times.

The positive relation between general financial welfare in a street and inequality on income hinted at in figure 6.7 requires further research. The test case of Netherlandish cities suggested a similar relation for mid-sixteenth-century 's-Hertogenbosch, but a possibly reverse situation in early nineteenth century Amsterdam.

A synthesis of residential patterns in early modern Netherlandish cities showed the residential preference of affluent households for central parts main access roads, whereas less affluent households generally occupied parts of these streets near gates. For Nijmegen, differences in altitude were a unique and determinative feature. Canals could be identified as a determinative factor in cities in Holland, whereas their influence on residential patterns in other Netherlandish cities was less clear. Around the corner segregation occurred in all cities. The phenomenon of opposite street segregation, clearly visible in some cities including Nijmegen, requires further examination and explanation.

Chapter 7

Conclusion

Research on past and present societies indicates a mutual influence between residential segregation and economic inequality. The debates on both subjects, which are barely studied in relation to each other, would therefore benefit from a more integrated approach. Based on a thorough investigation of studies on both subjects in early modern Netherlandish cities, this thesis offers solutions for methodical difficulties which may have hampered an integrated approach.

A case study of Nijmegen added data to both debates, offering an impression of income inequality on the city level and residential segregation on income for Nijmegen in 1694. Nijmegen was situated in a region not included in these debates so far, which meant that the city shared some social-economic and geographical characteristics with cities studied so far, but also fundamentally differed in others. As a consequence, the study of Nijmegen could serve as a litmus test for conclusions drawn so far, and stimulate new approaches.

An integrated study of economic inequality and residential segregation would view the internal geographical distribution of economic inequality within cities in addition to estimates of economic inequality on the city level in the form of, for example, Gini indices. A major difficulty in integrating both debates is the need to compare inequality levels and segregation levels.

In the debate on economic inequality, indices such as the Gini coefficient are used to compare between inequality levels over time and between societies. In chapter 5, the merit of indicating estimations of the margins of error has been shown. Firstly, by means of a discussion of the influence of groups exempt from paying tax on the Gini coefficient for late seventeenth century Nijmegen; secondly by a comparison of Gini indices based on direct income taxes available for early modern Netherlandish cities. For the test case of Netherlandish cities, most values seem to fall within each other's margins of error. Next to the limitedly available amount of data on both debates for the same cities in the same years, the lack of an indication of error rates hinders a study of this data in relation to residential patterns.

In the debate on residential segregation, a standard quantitative indicator comparable to the Gini index which facilitates a comparison of segregation levels over time or between different cities, is lacking. It is particularly complicated to compare between levels of residential segregation between different cities. In chapter 6, it is therefore suggested to compare between commensurable geographical units, such as harbours and squares with similar functions. The segregation level per geographical unit could be expressed by a normalized indicator for differentiation, such as the Gini coefficient. This may offer a quantitative indicator for residential segregation in addition to a

description of patterns. Preferably, statistical measures which offer a more complete view of the distribution than can be expressed by a single index only, such as box plots, would complete the analysis.

The case study of Nijmegen showed the potential influence of economic affluence on segregation levels within cities. High inequality levels were reflected in Nijmegen by many homogeneously poor streets. Homogeneously rich streets, on the other hand, were rare. A positive correlation between economic affluence and economic inequality could be observed on the street level. For Netherlandish cities, a similar conclusion has been drawn for mid-sixteenth-century 's-Hertogenbosch by Blondé, but a reverse pattern was observed for street-overlapping artificial geographical units in early nineteenth-century Amsterdam. These residential segregation patterns could be a feature of early modern cities, and deserve attention in future studies of residential patterns.

The case study of Nijmegen also draw attention to the possible influence of garrisons on both the development of economic inequality levels and residential segregation in early modern cities. In Nijmegen, especially the number of military households influenced measured inequality levels to a large extent. If households related to the garrison were excluded, the Gini coefficient for Nijmegen including exempt households differed just 4% at most in comparison to the Gini coefficient based on taxpayers only. Moreover, the level of income inequality in Nijmegen was comparable to levels in other Netherlandish cities if military households were excluded. The fluctuating sizes of garrisons possibly not only influences measured inequality levels, but may also have influenced social-economic relations among commoners in host cities. The housing of garrisons is therefore a factor to take into account in future research on the development of economic inequality. Moreover, garrison cities may function as a starting point for the study of the influence of population density on residential segregation levels. The case study of Nijmegen showed that such cities were often forbidden to expand, resulting in a high population density over time.

In many other ways, the case study of Nijmegen confirmed conclusions drawn on residential patterns in other early modern European cities. Just like other cities, Nijmegen showed a tendency towards a central-peripheral model on the level of wards as well as streets: peripheral areas tended to be less affluent than centrally located parts. The importance of accessibility and visibility may explain the relatively high levels of economic affluence observed in main streets in Nijmegen. Parallel to other Netherlandish cities, side streets were generally less affluent than main streets.

Next to this phenomenon of 'around the corner segregation', the case study of Nijmegen showed some cases of opposite street segregation. Households from the highest tax categories lived across households from the lowest tax category. This raises questions about the influence of panorama on the housing market in early modern Nijmegen. For cities in Holland, especially Amsterdam, the panoramic view offered by canals is considered of decisive influence on living patterns of affluent

households. In Nijmegen, building history and differences in altitude have probably been more important. The danger of flooding made low-level parts of the city less attractive to affluent households.

The possible influence of the development of economic inequality levels on these residential patterns remains open for future study. This thesis showed the methical possibility of such a study, and the potential benefits resulting from more attention to residential segregation in relation to economic inequality in the study of early modern cities.

List of abbreviations

GldA	Gelders Archief
HCO	Historisch Centrum Overijssel
inv. no.	inventory number
KS	Kleine Serie
NBER	National Bureau of Economic Research
OAA	2000 *Oud Archief Arnhem* (*1264-1885*)
OAN	1 *Stadsbestuur Nijmegen* (*1196-1810*)
RAN	Regionaal Archief Nijmegen
RGP	Rijks Geschiedkundige Publicatiën
SKN	0003 *Staten van het Kwartier van Nijmegen en hun Gedeputeerden (1574-1811)*

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