Conclusions

7.1 Introductory remarks

Having higher education has become increasingly common among both males and females in Europe and in the US. In 2006 one quarter of the population received a degree in higher education in the Netherlands, while years earlier this was only one fifth. Another important trend is the increase of the labour force participation of women. As a result, the number of double-income households increased considerably and nowadays double-income households are the majority of household types. Because double-income households have to combine two working places with one residential place, double-income households face a more complex work-home location problem. This problem, referred to as the ‘co-location problem’, may have important implications in terms of commuting behaviour, residential location and, hence, the distribution of households.

Part I of this thesis focussed on the relationship between household characteristics and their residential choice. Special attention was given to double-income households and couples of which both members are higher-educated, called ‘power couples’, and we analysed whether they, as a result of the co-location problem, differ in their commuting behaviour and location choice compared with other household types.
Part II of this thesis looked more deeply at the costs and benefits of the provision of an urban amenity; namely, parks and public gardens, and the disamenity of aircraft noise, and analyses whether the supply of these public goods is optimal. The results of Part I and Part II are summarized in the next sections (Section 7.1.1 and Section 7.1.2). Section 7.2 describes the policy implications of the findings. Finally, Section 7.3 makes suggestions for a future research agenda.

7.1.1 Conclusions of Part I

Chapters 2 and 3 focussed on the location problem of double-income households and of what are called ‘power couples’. Because both spouses of a power couple are higher-educated, it is argued that the co-location problem is even more severe for them. In order to solve the co-location problem, Costa and Kahn (2000) argue that dense urban areas are attractive. In the US they do indeed find an increase of power couples in large urban areas. Our analysis found the same trend for the Netherlands: during the period 1981-1998, power couples became increasingly concentrated in the Randstad, and at a higher rate than other couple types. The results indicate that the increasing concentration of power couples in the Randstad and the Intermediate Zone took place despite the fact that these regions became less attractive for other reasons. Further analysis revealed that one of these other reasons is that wage rates for university-trained people are no higher in the Randstad or the Intermediate Zone than in the Periphery, even though housing is considerably more expensive in the Western part of the Netherlands, congestion problems are concentrated there, et cetera. Within their region of residence, power couples are more often located in the medium-sized and large cities. Hence, these results show that the co-location problem is important for power couples, both in choosing a particular region as their residence and, in choosing a specific location within that region.

Due to their more complex work-home relation, one would expect that the commute of double-income couples would be longer than for single workers or single-earner households. However, even if we control for region and the size of the municipality, commuting distances of workers belonging to double-income households and power couples are on average not different from other workers. It seems, therefore, that double-income households, and, more specifically, power couples, are able to solve, or at least to mitigate, their co-location problem by paying considerable attention to the choice of their residential location. For power couples, this conjecture was confirmed by our finding that they are more likely to be owner-occupiers and, if they are, live in more expensive housing than could be expected on the basis of their income or other characteristics.

Chapter 3 then analysed the commuting behaviour and residential location of households more deeply. The effect of having a working spouse or belonging to a power couple on the commuting distance of both a male worker and female worker are estimated separately. The results show that the effect of having a working spouse does influence the average commuting distance of female workers, but belonging to a power couples does not appear to influence the average commuting distance of both the male and female worker. The absence of a separate effect of belonging to a power couple is quite surprising in view of the
strong results about the importance of the co-location problem of such couples reported in the literature. Also the cross-effect of being a power couple and a double-income worker is not significant. A potential explanation for this finding is that power couples pay more attention to accessibility to jobs when choosing their current location than other household types. In particular, they may be willing to pay more than other households for houses with good job accessibility.

We investigated the validity of this explanation by developing and estimating a residential location choice model in which households choose their residential location on the basis of natural and urban amenities as well as the accessibility of jobs. The model used allows for heterogeneity between households in the preferences of the characteristics of their residential location. The results showed that an average household would like to live close to a large labour market, close to a railway station, in regions with a high regional wage, and have urban facilities. Households are indifferent with respect to the distance to the nearest motorway slip road and the amount of nature. The preferences of the characteristics of the residential location of double-income couples do not deviate from the preferences of the average household. Hence, double-income couples do not have specific preferences for their residential location. Power couples, however, are willing to pay more than the average household in order to be located close to large labour markets and to have good urban facilities in their residential location. These results are in line with our hypothesis that the co-location problem of power couples is more severe than the co-location problem of double-income couples, and that they use their purchasing power to locate in their preferred location. We can therefore conclude that power couples do indeed differ with respect to their residential location compared with other household types.

The results showed that the location choice is not simply more connected with only the working place. Although accessibility to the workplace is still important, the amenities, that the location offers are also regarded as important; especially for power couples. This explains why these couples are more likely to live in large urban areas. However, these results imply that, if municipalities want to attract the higher-educated, being located close to large labour markets is not enough. They should also provide good urban amenities.

The last chapter of Part I, Chapter 4, focussed on commuting and estimated the effect of search imperfections on the length of the average commute. Search imperfections are defined as the presence of job and residential moving costs and lack of perfect information about job opportunities. Imperfect information implies that employed (and unemployed) workers decide to accept jobs and residences which do not minimize their commuting costs, because they do not have full information about all jobs and residences, and, therefore have to search for vacant jobs and residences. The model started with two assumptions that (1) the commute of the self-employed is the result of a search process for vacant workplaces; and (2) employees search for vacant jobs. Because the arrival rate of workplaces is much higher than the arrival rate of jobs, the self-employed can minimize their commute, whereas employees may have to accept jobs with a longer commute. In the empirical analysis, the extent of the ‘wasteful’ or ‘excess commuting’ is identified by estimating the
difference in the commute of employees and self-employed individuals. Our estimates indicate that about 40 to 60 per cent of the observed commute may be considered 'excess' due to search imperfections. This result is in line with earlier research, although those studies use aggregate data instead of micro-data.

In line with the job-search model, the excess commute is lower in urban areas. However, the excess commute is higher for the higher-educated because they have to search for more specialized jobs, whose employment density is much lower. These results comply with the results found in the previous chapters. Although the higher-educated, for example, power couples, experience a more complex work-home relationship, by paying extra attention to their residential location, they are able to mitigate their co-location problem. Although the excess commute of the higher-educated is larger, by living in large urban areas, they reduce their excess commute, which means that the average commute is not longer compared with that of other household types.

7.1.2 Conclusions of Part II

Although spatial planning produces large positive and negative welfare effects, knowledge about its actual effects are scarce. In Part II of this thesis we take a first step and investigated some important welfare aspects of two specific spatial planning measures; the provision of open space within cities, and the benefits of an aircraft noise reduction in the Amsterdam airport region. We used the cost-benefit method to analyse whether the provision of the amenities is optimal.

In Chapter 5 we analysed the benefits and costs of open space in three cities in the Netherlands. We derived a simple cost-benefit rule for the optimal provision of open space, with the price of private space (lot size for single-family houses or floor area for apartments) as the appropriate indicator of its cost. The condition was made operational by computing the willingness-to-pay for open space and private space on the basis of empirical hedonic price functions for three Dutch cities. In Amsterdam, The Hague and Rotterdam the presence of open space; namely, parks and public gardens, within a 500 meter radius around a house, increases the value of the house. Less surprising, but also important, is that households are willing to pay more for a house if the lot size (or floor area) is larger. Of the three investigated cities, the city of Rotterdam has the highest price per m² lot size, and The Hague has the highest price per m² floor area. The willingness-to-pay for open space is the highest in The Hague and the lowest in Amsterdam. The quality of open space seems to have an influence on the willingness-to-pay.

Households living in single-family houses have a higher willingness-to-pay for open space than households living in apartments. However, the conclusions with respect to the optimal provision of open space are the same in neighbourhoods consisting of single-family houses only and in neighbourhoods consisting of apartments only, with the only exception in the case of apartments in Rotterdam. In Amsterdam (the Vondelpark), The Hague and Rotterdam, the provision of open space is below its optimal level, and households would rather have more open space and less private space. These results are conditional on the use of a 500 meter radius for the effect of open space, as is current practice in Dutch spatial plan-
ning. Further investigation revealed that the willingness-to-pay for parks and public gardens increases with income, although not as rapidly as it does for private residential space. As a result, the optimal amount of open space reduces when the average income of a neighbourhood increases. Constraints with respect to private space have a large impact on the optimal planning of a neighbourhood. If floor area is fixed at a smaller size than the market participants would like: for example, due to government regulation, the density increases considerably and the amount of open space decreases. However, if floor area is fixed at a high minimum constraint, the optimal amount of open space increases and the density decreases.

In Chapter 6, the effect of transport noise on house prices in the highly urbanized area around Amsterdam airport was examined. While focussing on aircraft noise, we also accounted for background noise by taking multiple sources of traffic noise (i.e. road, railway, and aircraft noise) into account simultaneously. For all three sources of noise, threshold values are set at which the level of noise is generally experienced as nuisance. On the basis of our regression results, we conclude that a higher noise level means ceteris paribus a lower house price. Aircraft noise has the largest price impact, followed by railway noise and road noise.

The benefits of aircraft noise reduction are, in a larger study (by Lijesen et al., 2010), compared with the costs of reducing noise for airlines. Several measures, such as the reduction of the number of flights, fleet substitution, and alternative approach paths, are assessed and their costs are computed. The corresponding cost function is constructed and compared with the benefits of an aircraft noise reduction. In the case of Amsterdam airport, the optimal level of noise reduction appears to be 3 dB. Welfare-increasing measures include alternative approach procedures, fleet substitution, and early depreciation of noisy planes. Reducing the number of flights has a negative effect on the net welfare.

In both studies the benefits of the amenities are valued by using the hedonic price method. In the hedonic price method, the monetary effect of a marginal change of an amenity is valued by the corresponding differences in house prices. This implies that we can – at best – only measure the value that residents of the area attach to the amenity. The value that non-residents attach to the amenity may also be relevant, especially in areas that are attractive for recreation purposes or where employees working close by go out for lunch. But also other benefits, such as positive effects on health and ecological benefits, are not included in our monetary valuation by using the hedonic pricing method.

With respect to the cost-benefit analysis of open space, another important issue is that we were not able to correct for the quality of parks and public gardens. However, as shown in the case of the Amsterdam Vondelpark, this does seem to matter, as the quality of the open space can substantially change the value people attach to open space.
7.2

Policy implications

Power couples experience a co-location problem, but, by paying considerable attention to their location choice, they are able to at least mitigate their problem. This means that the commuting distance of power couples is on average not longer than that of non-power couples. Accessibility to a large labour market, good transportation facilities and urban facilities are important location characteristics of power couples. These findings suggest that the increasing importance of power couples has important consequences for the distribution of households over space at, both the national and the regional scale in the Netherlands.

At the national scale, the significance of dense labour markets for solving the co-location problem makes the Randstad an attractive region of residence for double-income couples and power couples. Although our study did not focus on the socio-demographic composition of the location, the increased concentration of power couples in the Randstad can be interpreted as part of a self-reinforcing process of spatial concentration. Waldorf (2009) showed that the higher-educated population itself becomes an amenity that attracts other higher-educated migrants. As a result of the self-reinforcing process of the higher-educated, the brain drain makes the Periphery a less attractive region for starting new business activities. As a result, local labour markets in the Periphery become less dense, accelerating the outflow of power couples and business activities. The consequences are that the disparities between regions in the Netherlands will enlarge: some regions will experience population growth, other regions a population decline, a process that is already happening in the Netherlands. Vermeulen and van Ommeren (2009) showed that the share of people in the Periphery decreased with 5.1 per cent over the period 1973-2002. Some municipalities in the Periphery have already had a reduction in population size (van Dam et al., 2006). Furthermore, van Oort et al. (2007) show that, during the period 1999-2006, the outflow of employment from the Periphery is higher than the inflow of employment, which results in a reduction of the share of employment in the Periphery.79

However there are counteracting factors. When we look at the housing market in the Randstad, it is characterised by shortage and frictions. Van Oort et al. (2007) show that during the period 1996-2005 only a quarter of the total new houses in the Netherlands were built in the Randstad. Most new houses (39 per cent) were built in the Intermediate Zone, and 37 per cent in the Periphery. Therefore, we can conclude that, although at a national scale the significance of dense labour markets for solving the co-location problem is an important location feature for households and especially for power couples, which makes the Randstad an attractive region, there are counteracting forces that make it less attractive as a residential...

79 It should be noted that at a national scale the Periphery is very heterogeneous in terms of municipalities. Some municipalities are very successful in gaining more employment and households (such as those in the Province of Overijssel), although other municipalities are losing population.
location. If these forces become stronger, the chain of cumulative causality may be broken.

At the regional scale our results suggest that the trend towards suburbanization seems to be mitigated by the relative attractiveness of larger municipalities in realizing suitable employment-residential arrangements; especially for power couples. However, when we look at the housing demand of the higher-educated, frictions on the housing market are also present. These frictions are particularly large in the Randstad. The OECD discusses in its Territorial Review of the Randstad (2007), that the lack of high quality dwellings, a consequence of the rigidities in Dutch housing markets, might explain the lagging labour productivity growth in the Randstad over the past few years compared with other metropolitan areas. Due to the large share of social rented housing, the share of owner-occupied houses in Amsterdam and Rotterdam is only 20 per cent, which, compared with other European cities, is low. In London, for example, 60 per cent of the houses are owner-occupied houses (Manshanden and Merk, 2007). Although the frictions between the demand and supply of high-quality houses are large already, the increase of power couples in the Randstad and the fact that they are often owner-occupiers suggest that these frictions will even become larger in the future. A decrease of social rented housing in cities in the Randstad might reduce these frictions on the housing market.

Dutch land use planning – and particularly its attempt to preserve open space outside cities – has general support among the population. However, there has been less attention for the potentially disadvantageous side effects that come in the form of high densities, high house prices, and more pressure on open space within the cities’ borders. Our results show that the provision of open space in three Dutch cities in the Netherlands is not optimal, and households would rather have more open space than residential land. This result implies that, although the compact city concept seems to be successful in saving open space between cities (see Koomen et al., 2008), newly built houses should not be built at the expense of open space within cities.

Our results with respect to the location choice of households show that the Randstad is an attractive residential location due to its accessibility labour markets and the provision of urban amenities. Moreover, because of the increase of the educational level and labour force participation of women, our results show that the demand for living housing near or in cities will even increase. As Lörzing et al. (2006) show, most new dwellings in the Randstad are built in locations outside the municipalities of large labour markets. An example is Almere, which is designated as a growth centre to accommodate the population growth of Amsterdam. However, due to its large distance towards a large labour market and the low(er) supply of urban amenities the residential location of Almere is not the one that is most preferred by the average households. This is especially the case for power couples, who are willing to pay a high price in order to live close to large labour markets and urban facilities.

If we assume that building new dwellings inside the cities is not possible due to a lack of available land, then building new dwellings along the edge of the city might be the most
welfare-enhancing solution. However this means that open space on the fringe of the city will be reduced. Furthermore, the distance, of households living in the city, towards the city fringe will also increase. However, not withstanding these negative effects, because the location of new dwellings are built at the most preferred location, this might compensate the negative effects, resulting in positive welfare effects. However, this important question is beyond the scope of this thesis and should be investigated in the future.

The increase in education level and labour participation implies an increase in (household) income. Household income influences the demand for products, such as urban amenities and disamenities, and hence influences the optimal provision of amenities. Because spatial planning plays an important role in the supply of some of the amenities, such as the provision of open space, changes in the demand of these amenities also has important consequences for the government. The results with respect to demand for open space show that the demand increases with income. This result complies with the finding that power couples are willing to pay extra in order to have more nature in their residential location. However, income also changes the demand for other goods. Our research shows that an increase in income also has a positive effect on the demand for private space. Our application of the demand functions shows that, because the increase of the willingness-to-pay for lot size is higher than the increase in the willingness-to-pay for open space, it would be optimal to decrease the amount of open space, that results in an increase of the density. Accessibility is an important location factor for households in the Netherlands, and especially for power couples. However roads, railways and airports produce noise, which is regarded as a disamenity, and noise above a certain threshold value decreases the willingness-to-pay for a house. Aircraft noise covers a large part of the Randstad, as can be seen in Figure 6.3. This part of the Netherlands is characterized by large frictions on the housing market. Our analysis of the benefits of an aircraft reduction and the associated costs implies that it is optimal to reduce aircraft noise with 3 dB. However, if the income level of households in this part of the Randstad increases, and this results in an increase in the demand for silence, then the benefits of a reduction in aircraft noise also increases. The total benefits of reducing aircraft noise increases and, if the costs of reducing aircraft noise remain the same, a lower level of aircraft noise is optimal. Another fact that influences the benefits of aircraft reduction and hence the optimal level of aircraft noise, is the number of households that experience (aircraft) noise above a certain threshold. If more houses are built in the region of Amsterdam, a reduction of aircraft noise is now beneficial for more households. The total benefits of reducing aircraft noise increases which imply that, if the costs for reducing aircraft noise remain the same, a lower level of aircraft noise is optimal.

The benefits of an aircraft noise reduction can be used in the discussion about how to finance measures that reduce aircraft noise. The pricing mechanism, for example, might be an effective policy option because then the users who enjoy the benefits of cheap and frequent flights would pay for the external effect of aircraft noise. However, it should be noted that a limitation of our research is that it only looks at a single airport, thus ignoring
the effects of travellers diverting to other airports, as well as the effects of other airport’s attempts to reduce noise. Further research should take these issues into account as well.

7.3

Future research agenda

In several stages of this research, we found that power couples behave substantially differently from double-income households. Our analysis focus on both the national scale and the regional scale, but it would also be interesting to apply the model on the more detailed scale of neighbourhoods. Especially in large cities, households sort themselves, and it is important to understand the preferences of households and especially the heterogeneity between households at neighbourhood level.

Another possible research topic for the near future would be to correct for differences in the diversity of the labour market. Although large urban areas offer more potential job matches, and hence the probability of drawing a good initial match, or a subsequent match, is higher, a ‘dense’ labour market by itself is not more attractive to double-income couples as a solution for their co location problem. In a dense labour market, there are not only more jobs, but also more workers and as a result, there will be more competition for jobs. In an empirical analysis of the overqualification of the trailing spouse and its relation to the size of the location, McGoldrick and Robst (1996) found no significant relationship between population size and the likelihood of the trailing spouse (women) being overeducated. The authors suggest that it is not the market’s size which is important but its job composition, although more research is needed to answer this question.

Although our analysis focussed on double-income couples and power couples, the residential model could also be used for other subjects. Another important trend in the household dynamic in the Netherlands is the ageing population. The question whether retired people have different preferences with respect to their residential choice, and where they would like to live, are important in the distribution of households. Another interesting application of the model would be to analyse the differences between the lifetime of households and the implications with respect to their location preferences. At the moment, a PhD student at the VU University is applying the model to investigate the location behaviour of households in relation to cultural heritage.

The use of cost-benefit analysis in evaluation studies is becoming increasingly popular, and the number of studies which attend to give a monetary value to public goods are still growing. However, the application of the estimated willingness-to-pay in different regions or in a different context is problematic. The reasons for this are: the large variation in methodology used, and hence differences in the estimated benefits; and the variation in the definitions of the amenity, which influences the estimated willingness-to-pay. For example, the variation of the definition of open space is large. Open space can imply parks and public gardens
(as in our study), but may also include cemeteries, golf courses, agricultural areas, forests, and amusement parks. Another important aspect is the social-economic composition of the population. Our analysis of the demand function of open space show that income, age, and the presence of children, all influence the willingness-to-pay for open space. However, most of the time, only the willingness-to-pay for a marginal reduction in aircraft noise is estimated, which is only one point on the demand curve of households. As in the case of our analyses of aircraft noise reduction, due to a lack of data on household characteristics and empirical problems, this second step is usually left out and means that the individual demand curve cannot be computed. Especially for the densely populated Netherlands, it would be interesting to investigate how the willingness-to-pay for noise reduction relates to income and other household characteristics. Therefore we can conclude that it is important to acquire knowledge on households demand for public goods and how it behaves in different situations with different consequences.

In this thesis, we have investigated two spatial planning measurements and have analysed whether the supply of these amenities are optimal. Our analysis shows that it is possible to establish welfare-based levels of the provision of open space in cities and noise reduction. This line of research is the first step towards determining the optimal size of government intervention. Nevertheless, there are several other important spatial planning provisions for which it would be very interesting to determine whether the supply is optimal: for example, the supply of open space between cities, like the Green Heart in the Randstad. However, several of these government interventions go beyond the local level, and hence the hedonic pricing method is not suitable to measure the full benefits. Other empirical methods should therefore be used.