The dynamics of female labour force participation: How family policy influences women's work behaviour

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Abstract

Female labour force participation (FLFP) in the UK has stagnated in recent decades in spite of policies that have tried to increase the number of women in the labour force. This study investigates how various aspects of UK family policy operate to keep the level of female labour participation from rising. The system dynamics model developed to understand the dynamic behaviour of the system operationally indicates that there is a relationship between the labour supply of mothers and grandmothers due to the high costs of childcare in the UK. The preliminary outcome of the model suggests that the rising cost of childcare too quickly outgrows the subsidies meant to stabilize the system. This affects families with varying income levels and number of children differently. This study provides insight into family policy dynamics in the UK with a systems perspective that is lacking in the literature.

Key words: System dynamics, social policy, family policy, female labour force participation, childcare, gender.

Introduction

Female labour force participation (FLFP) is a topic that is on the agenda on many levels both for nation states as well as organisations, for a variety of reasons. Some nations are obliged to create policy influencing the matter due to commitments to organisations such as the EU, the UN and the World Bank etc, and aim only at meeting these obligations; others have realised the potential for building capacity and harnessing the skills and talents of the population half that historically have been kept away from paid work. With this in mind, countries design and implement policies to try and influence FLFP towards the desired level. However, both the range and extent of the chosen policies determines the effect it has on FLFP.

The United Kingdom has gradually throughout the last century, made a shift from a male earner, female career model of family, towards a dual earner/career model. This shift has led to increased political pressure for policy on work/family reconciliation that supports the current model of families. In the United Kingdom, FLFP has thus been a key concern on the political agenda for quite some time. As a long-term member of the EU (before Brexit), the country has been obliged to comply with EU guidelines and suggestions for social policy that influences FLFP. Indeed, the UK government has on many occasions shown that they wish to harness the skills and potential of women in order to boost growth, and has since 2000 invested heavily in a variety of policies to support women's employment in general. The main

reason for doing this has, however, so far been related to the 1999 government pledge to eradicate child poverty (Ostner et al., 2008). Yet, the expectations of the state do not match the behaviour of FLFP. The low participation rates for women in their childrearing years brings down the total FLFP rate which has stagnated around 53-55 percent since 1990 (see figure 1). Considering this stagnation in light of the variety of policies that has been implemented since 2000 it is striking that there is not more change in the numbers.

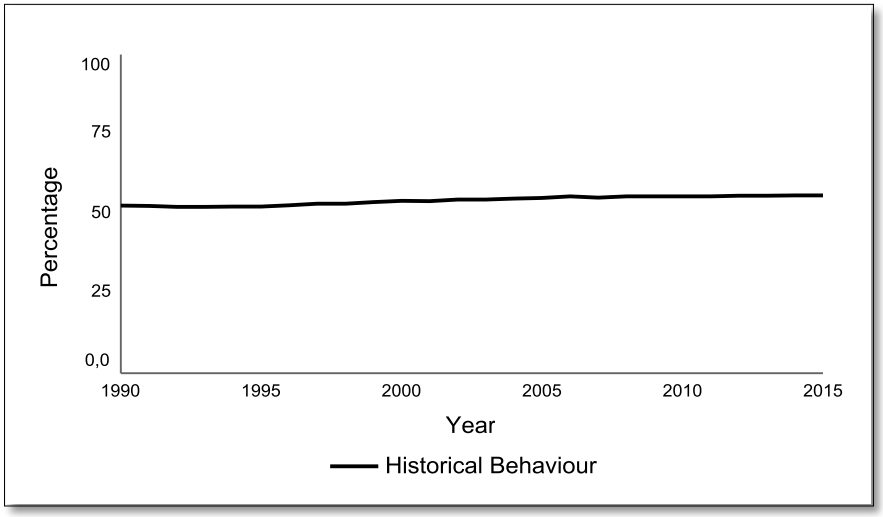

Figure 1 - Female labour force participation rate in UK, adapted from World Bank (2017)

As it is widely recognised that a key factor for women's right and ability to access paid work is access to affordable, quality childcare; the UK has followed EU advice and focused strongly on childcare initiatives to support mother's access to paid work. Thévenon (2013) identifies formal childcare for children under the age of three as the main driver for FLFP.

Research relating to the case for government intervention in childcare in the UK has been in-conclusive to date regarding whether or not subsidising childcare have an effect on the labour supply of mothers (Emmerson et al., 2014). Still, evidence from other western European countries, like the Nordics, has proven that there is a close relationship between access to high quality, affordable, childcare and high female labour force participation (Lammi-Taskula et al., 2012).

The research commissioned by the Family and Childcare Trust (2016) finds that the majority of informal childcare in the UK is provided by healthy grandmothers below retirement age. In light of this finding, it is reasonable to believe that there is a relationship between female labour supplies at different stages of women's lives. This relationship has not been the focus of much research and few pieces of literature to date can be said to address the relationship between parental (maternal) labour supply and informal childcare provided by grandparents (in this case largely grandmothers). As the UK currently has active policies both for increasing the labour supply of mothers, but also for increasing the labour supply of older women (Gray, 2005), it is a surprise that the relationship between the two seem to have remained unnoticed. When considering the above in context with measures of child poverty and how women after retirement age are more than twice as likely to live below the poverty

line than men (Price, 2006), it can be proposed that the time women are spending working part-time or not at all due to childbearing and rearing, are causing a spiralling, negative, effect throughout many areas of society. In light of this, the research question of this paper is: ***How does family policy in the form of subsidised childcare influence the dynamics of female labour force participation?***

Although there is a range of literature on the influence of childcare on mothers' labour force participation as well as on grandparent's role in providing childcare in Britain, little work has been done on investigating the relationship between mothers and grandmothers labour force participation in relation to childcare practices. This study aims to add to the social policy literature by identifying and highlighting the underlying feedback loops that binds together the labour force behaviour of mothers and grandmothers as well as offering a simplified analysis of the UK governmental policy of formal childcare and its impact on FLFP.

The System Dynamics Model

Sources of government data, e.g. the UK Office for National Statistics (ONS), report FLFP based on purely if women are *participating* or not, regardless if the percentage worked is 2, 20 or 100 (European Commission, 2015). When benchmarking FLFP from the ONS against male participation rates, the impression is given that there are nearly no difference in labour market participation between the genders in the UK; yet, when taking into account full-time equivalent hours and that 40 percent of women work part-time whilst only 2 percent of men work part-time (Office for National Statistics, 2015), it is clear that there are indeed differences between men and women's participation in the labour force that needs to be addressed by policy.

In light of the above, the obvious difference that can be extracted from the data is the number of hour's men and women spend in paid work. This issue is at the core of this study. Women are spending fewer hours in paid work than men when they apparently are willing to participate at the same rate. Similar numbers of men and women are willing to participate in paid work; still women are not able to work similar hours to men; even after the excessive policy pieces implemented to address the issue in the last 15 years. This is in line with findings from several studies conducted on behalf of the UK government (see for instance Harper and Walport (2014)). For example, a report by the Women's Business Council (2013) found that there are more than 2.4 million women in the UK who are not in work but who want to work. In addition, there are 1.3 million women who wish to increase the hours they spend in paid work.

Subsidies in the area of formal childcare has been increasing since they started in 2000 but are still limited in terms of age and number of hours per child and are therefore not sufficient in terms of allowing the mother to go back to full-time work without relying on other sources of childcare such as grandmothers. Most UK parents today rely on a combination of formal and informal childcare to get their childcare needs covered. As mentioned before, the governmental shift in 1997 brought a new focus on social policy; this also meant increased focus on childcare and supporting policies. In 1998 the government introduced the first National Childcare Strategy (Campbell et al., 2003), promoting the uptake of formal childcare by supporting the creation of more nursery places. However, the use of informal childcare still

prevails as grandparents remains the largest group of childcare providers in the UK (Rutter, 2016). It is in this context that the model was developed.

Boundaries and assumptions

A number of simplifying assumptions were made throughout the modelling process:

- It is assumed that women will automatically offer any hours they have available for participation in paid work on the labour market.
- It is assumed that the decision to pay for childcare hours is purely based on how large the fraction of childcare costs is in relation to a mother's income.
- Although the number of children a mother may have is considered in the model, it does not consider the age of the different children.
- It is assumed that childcare costs are the same for any child under school age.
- It is assumed that hours subsidised are the same for all children below school age.
- Based on evidence from the literature, the assumption that if affordable, high quality childcare is available, grandmothers will not provide informal free childcare is made.
- It is assumed that all informal childcare is provided by grandmothers although in reality a smaller percentage of informal childcare is provided by neighbours, friends, older sibling etc. Furthermore, it is assumed that all grandparental care is provided by grandmothers although a small percentage of this care is actually provided by grandfathers.
- Only two parent families are considered in the model. As single parents are affected by a large number of additional governmental policies, it was decided to leave such families outside the boundaries of the model.

The Model Structure

Arrays are used to give the model different layers, each representing a different dimension/attribute. Each dimension is divided into several elements which represent the different variations available. The model has three dimensions, age group, income level and number of children below school age which are all fully explained below.

The age group layer is split into three different elements, namely 16 to 25, 26 to 35 and 36 to 45. These three age groups cover the average fertile years for a woman. This layer was included to represent how the conditions surrounding a mother's decision to participate in paid work or not changes with age, for instance will access to informal childcare through grandmothers be less for a mother in the 36 to 45 age group than for a younger mother because of the likelihood of her own mother being less capable to provide it due to higher age.

The income level layer is also split into three different elements: low, medium and high income. This layer was included to represent how a family's income level impacts on a mother's labour force participation. An example of this is how the childcare cost fraction is much higher for a mother in a low income family and she therefore has less incentive to work than a mother who earns a high income.

The layer called number of children below school age refers to how many children a mother may have between 0 and 5 years of age. The elements of this layer range from 1 to 3 as it is unlikely that a mother has more than 3 children in that age group at the same time. This layer

was included to illustrate how the presence of any additional children means higher childcare costs and thus influences the childcare costs fraction and therefore also mothers decisions to work.

The model consists of several feedback loops that are influenced by each other. The next section will show stock and flow diagrams of the different loops and explain how they are connected. Figure 3 below shows a stock and flow diagram of the mother's work participation loop; this loop is responsible for adjusting mothers work participation hours.

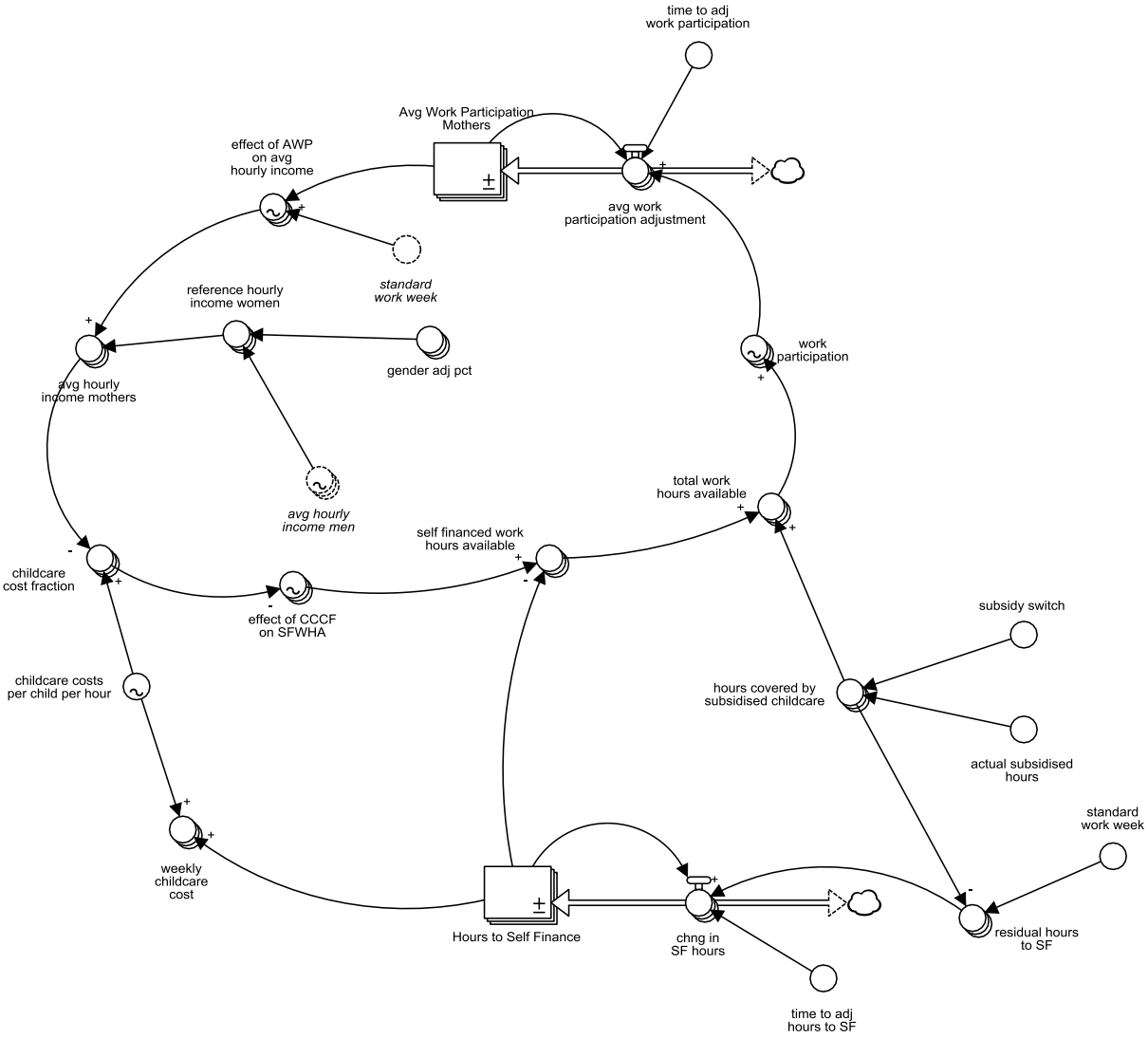

Figure 2 – Stock and flow diagram of mother's work participation loop

The work participation is determined by the variable "total work hours available" which add up the "hours covered by subsidised childcare" and the "self financed work hours available". The "self financed work hours available" is determined by the stock "hours to self finance" multiplied with the "effect of the CCCF on SFWHA" (effect of childcare cost fraction on self-financed work hours available). This effect is based on the assumption that mothers who earn less or just above childcare costs are unlikely to pay for any childcare hours as in practice it does not pay for them to do so whereas the decisions of mothers who earn 50% or more than

their childcare costs are unlikely to be forced to reduce their hours due to them being unable to afford childcare or it not paying to work. The "childcare cost fraction" divides the "childcare costs per child per hour" on "average hourly income mothers". "Average hourly income mothers" is given by "reference hourly income women" which is based on the "average hourly income men" but adjusted for gender difference in accordance with the historical gender pay gap, the reference income is influenced by an "effect of average work participation on average hourly income" in order to give "average hourly income mothers". The "effect of average work participation on mothers average hourly income" represent the assumption that the larger the number of hours you participate in paid work, the higher the percentage job position you hold, the higher position percentage the higher the wage and is thus given by the stock "average work participation mothers". This stock changes through the flow of "average work participation adjustment" which is affected by the variable "time to adjust work participation" which is one year, as well as the variable "work participation" which is a first degree smooth delay of "total work hours available".

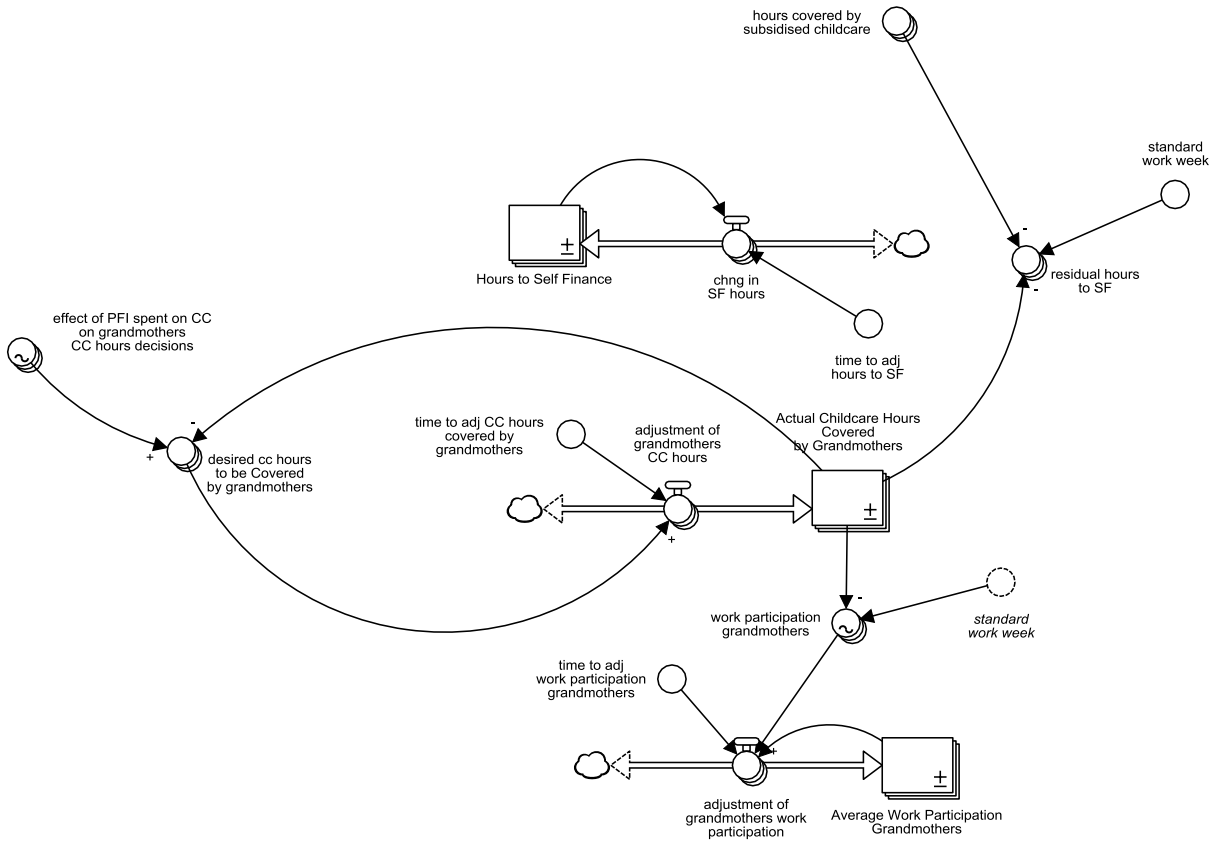

Figure 3 – Stock and flow diagram of grandmothers work participation loop

In figure 3 above we can see how the mothers work participation loop is influenced by the grandmothers' work participation loop through the connection of the stock of "hours to self finance". The variable "residual hours to self-finance" deducts the "actual childcare hours covered by grandmothers" and the "hours covered by subsidised childcare" from the "standard work week" (40 hours) in order to give the actual number of hours parents have to self-finance for them to hold full time work under the assumption that the parent which hours

it will compromise is the mother. The “desired hours to self-finance” changes the stock of “hours to self finance” through the flow called “change in SF hours”, this flow is also affected by the variable “time to adjust hours to self finance” which is set to one year. “Residual hours to self finance” is as mentioned before influenced by the stock “actual childcare hours covered by grandmothers”, this stock changes through the flow of “adjustment of grandmothers CC hours”. This flow is influenced by a “time to adjust childcare hours covered by grandmothers” of one year, as well as by the variable “desired cc hours to be covered by grandmothers”. “Desired cc hours to be covered by grandmothers” multiplies the “actual childcare hours covered by grandmothers” with the “effect of PFI spent on CC on grandmothers CC hours decisions”. This effect is based on the assumption that the higher the percentage of total family income is spent on childcare the more likely grandmothers are to provide childcare, it as arrayed and gives a different effect for the different levels of income as theory suggests grandmothers of low income families provide more childcare and grandmothers of high income families provide less. The stock of “average work participation grandmothers” changes through the flow called “adjustment of grandmothers work participation”, which in turn is affected by the “time to adjust work participation grandmothers” which is an estimate of two years, and by a variable called “work participation grandmothers”. The variable “work participation grandmothers” deducts the “actual childcare hours covered by grandmothers” from the “standard work week” to give the hours grandmothers have available for work. It is built as a graphical effect built on the assumption that the more hours you have available the more you work but that if you only have very few hours available you may choose to not work at all as the effort to do so is to large compared to the gain. It is also based on the assumption that even though grandmothers may have a full standard work week available they may work less due to other constraints i.e. part-time work being the only work available etc.

In figure 4 we can see how the two loops of mothers and grandmothers work participation interacts through the” effect of PFI spent on childcare on grandmothers childcare hours decisions” which uses the “percentage of family income spent on childcare” as input. The “percentage of family income spent on childcare” divides the “weekly childcare costs” on the “family income” and multiplies with the variable “percentage” (100). “Weekly childcare cost” multiplies the “childcare cost per child per hour” with “hours to self finance” and adjusts for number of children in the family. “Family income” adds together the average weekly income of women and men to give the total family income. “Average weekly income men” multiplies the exogenous variable “average hourly income men” with the “standard work week” whilst “average weekly income women” multiplies “average hourly income mothers” with the stock “average work participation mothers”.

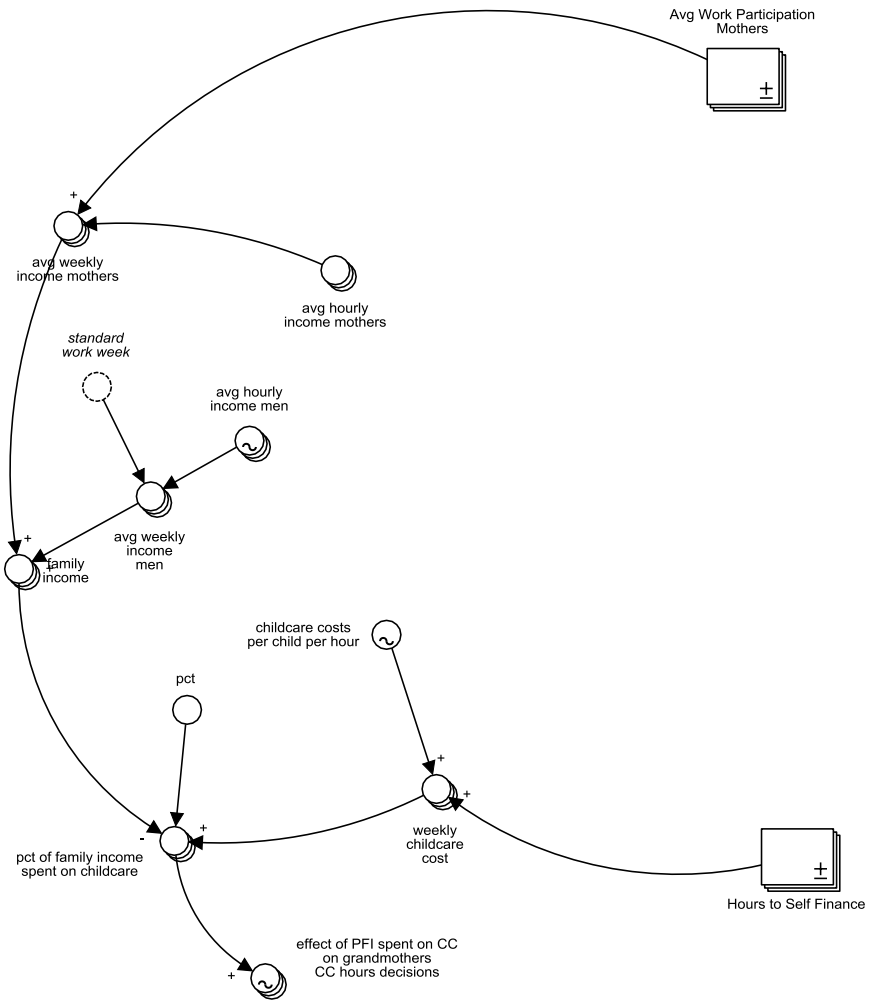

Figure 4 – Stock and flow diagram of the connection between the mothers and grandmothers work participation loops through the effect of percentage of family income spent on childcare on grandmother's childcare hours decisions

General model behaviour

The reference mode presented in the introduction shows the total female labour force participation rate from 1990 to 2015 adjusted for full-time equivalent. The data used as base for the reference mode is publicly available, but unfortunately it was not possible to source any data that separate female labour force participation by age groups, presence of children, actual number of hours worked, and marital status. This made it necessary to estimate initial values based on the assumptions presented earlier in the paper. This, in combination with the model's focus being on a very particular group of women, namely mothers of children below school age in a two parent relationship and the grandmothers in such families who are active in the labour force; implies that the model behaviour cannot easily be compared to the reference mode and the results must, for these and other reasons, not be confused with reality. Yet, the model behaviour does give useful insights into how mothers and grandmothers work participation is affected by the presence of subsidised childcare hours, and how subsidies affect mothers differently based on the circumstances of their life.

The general model behaviour shows that the average work participation of mothers varies greatly depending on their income. The number of children a mother has (referring to the

number of children aged 0-5) also influence her work participation. Mothers work participation is determined by the number of hours they have available for paid work (i.e. the number of hours they are able to access care for their children). The family income level greatly affects this, and mothers in low income families therefore work the least as they cannot afford to pay for many hours of childcare and thus rely on the free childcare hours grandmothers can provide. Hence, grandmothers in low income families work the least hours, as the incentive for them to reduce their hours to provide childcare is large because of the high percentage of family income that low income families need to spend on childcare in order for the mother to participate in paid work.

The greater the number of children a mother has below school age, the fewer hours she works. This holds true for all age groups and income levels. However, the higher a mother's income is, the less her number of children affects work participation. This reflects the findings of Viitanen (2005) that higher income mothers can afford childcare and thus are less likely to reduce work hours due to the financial impact of childcare costs.

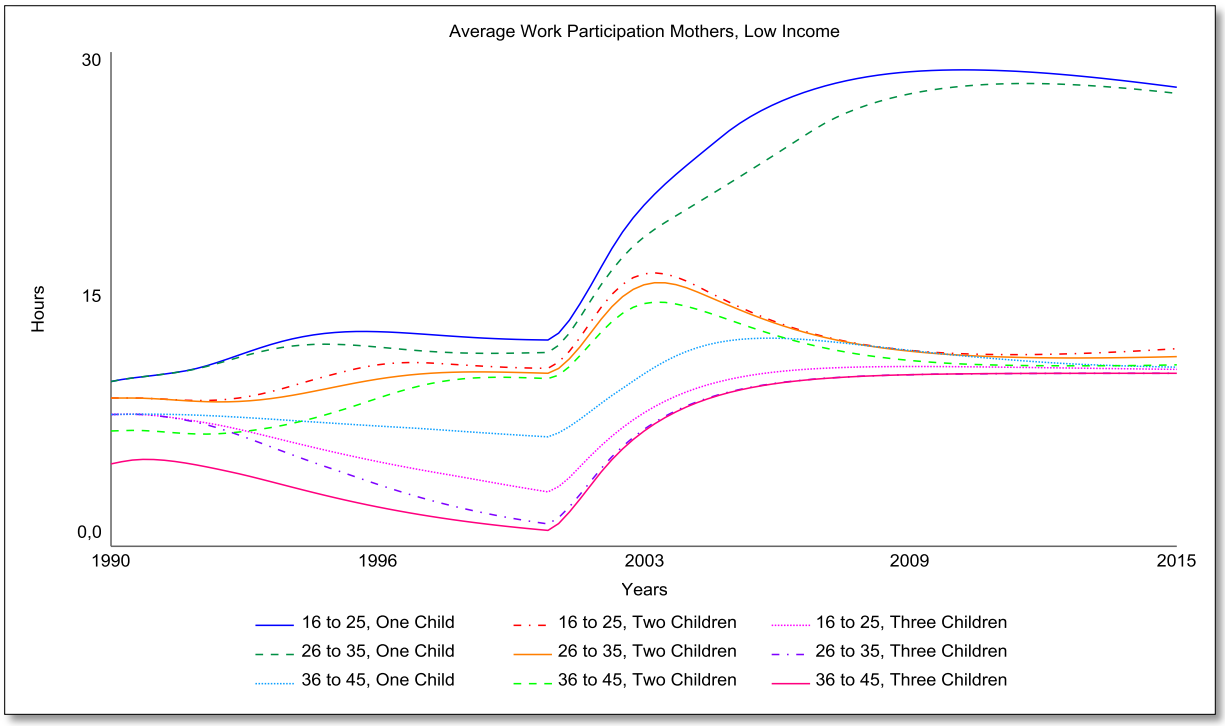

Figure 5 – Average work participation mothers of low income families by age group and number of children

During the period before subsidies start in 2000, work participation is 13 hours a week or less for all low income mothers regardless of age group or number of children. The 15 hours of subsidised childcare per child available from year 2000 causes a steep increase in work participation during the first few years of the policy. However, the effect is much greater for mothers with only one child than for mothers with two or three children below school age. The exemption is mothers aged 36 to 45 with one child as the grandmothers in such families are highly likely to be older and thus less likely to provide childcare. The reason subsidies causes a greater response in mothers with only one child below school age, is that the costs

multiplies with the number of children a mother needs to cover with childcare. The more children below school age present in a family, the higher the percentage of the family income would be needed to pay for childcare in order for the mother to participate in paid work, as illustrated in figure 6 below.

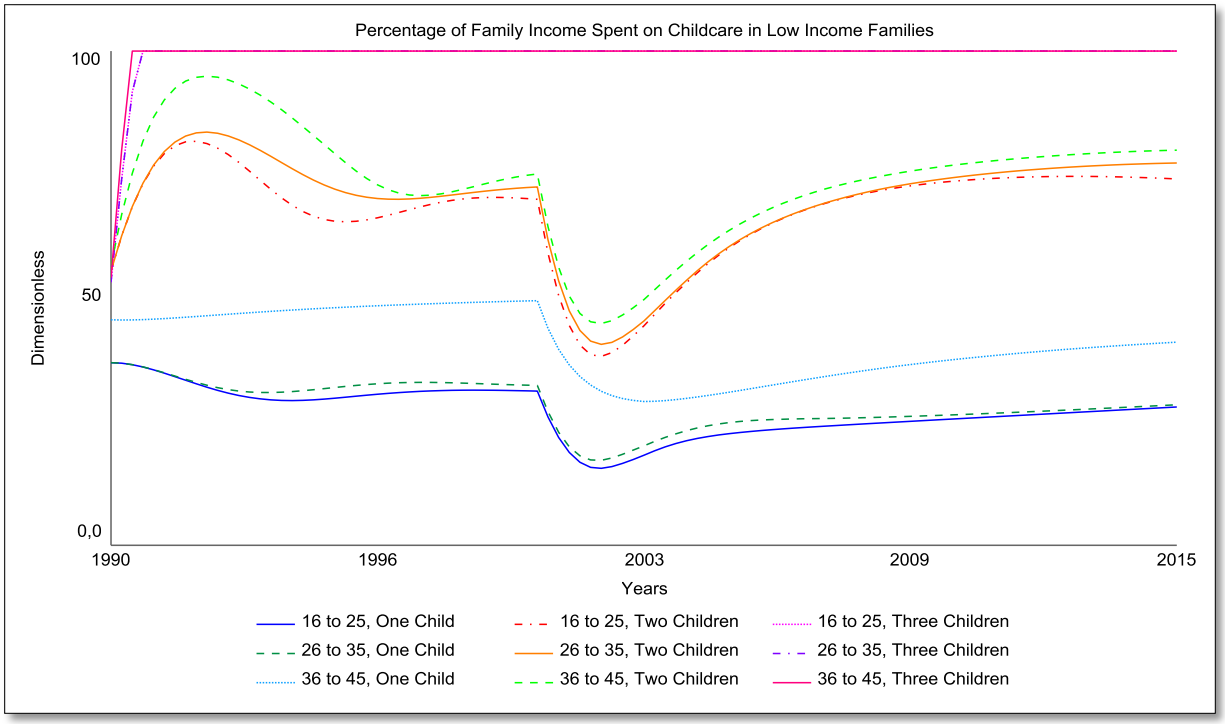

Figure 6 – Percentage of family income spent on childcare in low income families

Although initially favourable, the effect seem to fade after only a few years and after 2005 we see a decreasing behaviour towards lower level of participation for all but the mothers with only one child in the age group. This behaviour is due to the percentage of family income spent on childcare. Childcare prices rose significantly in the period, and much faster than wages. Thus, while the 15 hours of subsidised childcare per child caused the percentage of family income spent on childcare to drop drastically initially, around 2003 the percentage of family income spent on childcare started to rise again because of to the increase in childcare prices in comparison to wages.

In figure 7 we can observe how the subsidised childcare hours initially caused a drop in weekly childcare costs for low income families. However, by 2015, the weekly childcare costs had risen above the level it had before subsidies were introduced. Although wages also increased during the period, this was not sufficient to counteract the effect of the increased childcare prices. This is evident in figure 6 above portraying the percentage of family income spent on childcare. Comparing the development of this percentage of family income spent on childcare with the development of weekly childcare costs in figure 7, we can see how both these variables exhibit an initial favourable reaction to the subsidies in year 2000, only gradually starting to return towards previous levels after a few years, despite the fact that families are having to self-finance fewer hours then before.

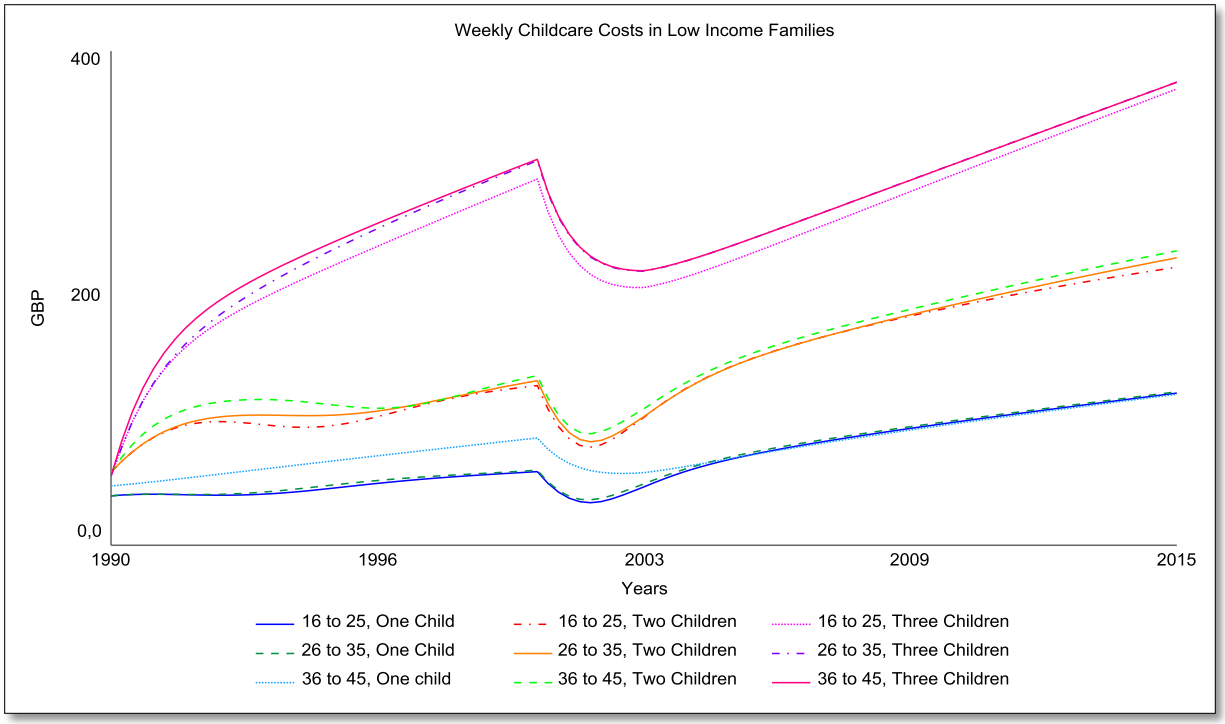

Figure 7 – Average work participation mothers of medium income families by age group and number of children

Grandmothers provide informal childcare as a response to families need. A high percentage of family income to be spent on childcare (under full *formal* care), works as an incentive for grandmothers to reduce their hours of paid work in order to provide free, informal childcare for grandchildren and thus give families less formal childcare hours to cover. The behaviour of grandmothers work participation and childcare hours covered in the case of low income families are shown in figure 8 and 9.

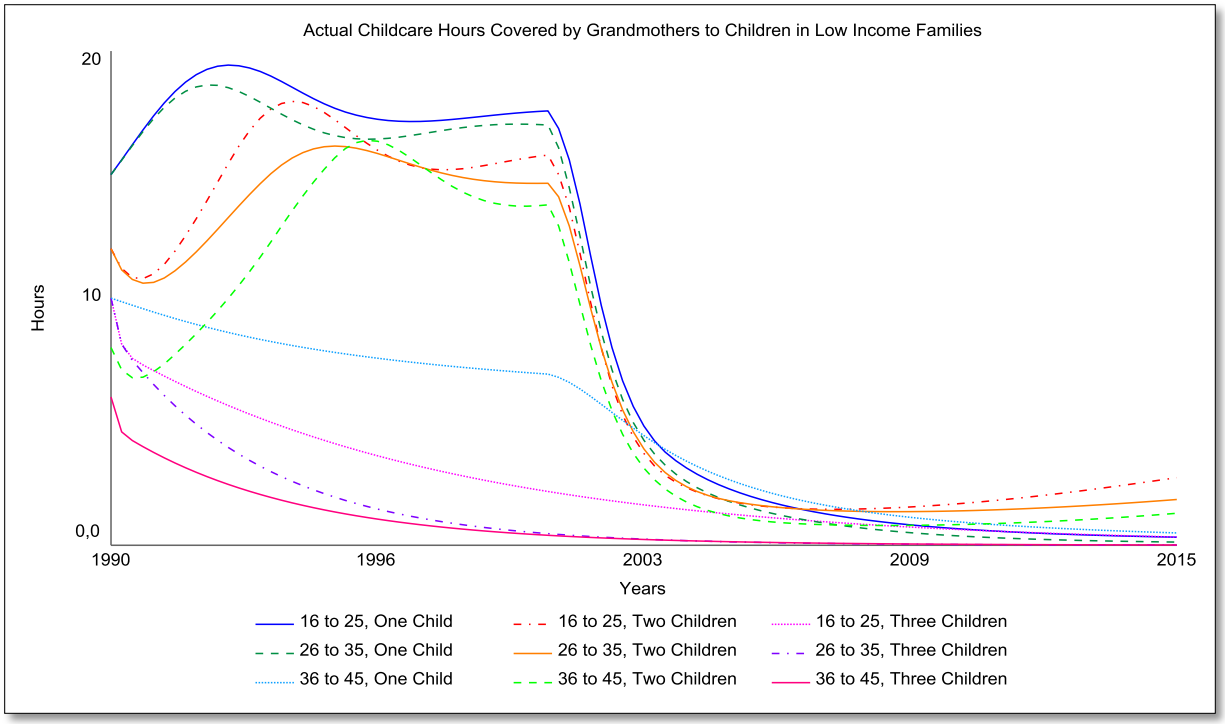

Figure 8 – Actual childcare hours covered by grandmothers to children in low income families

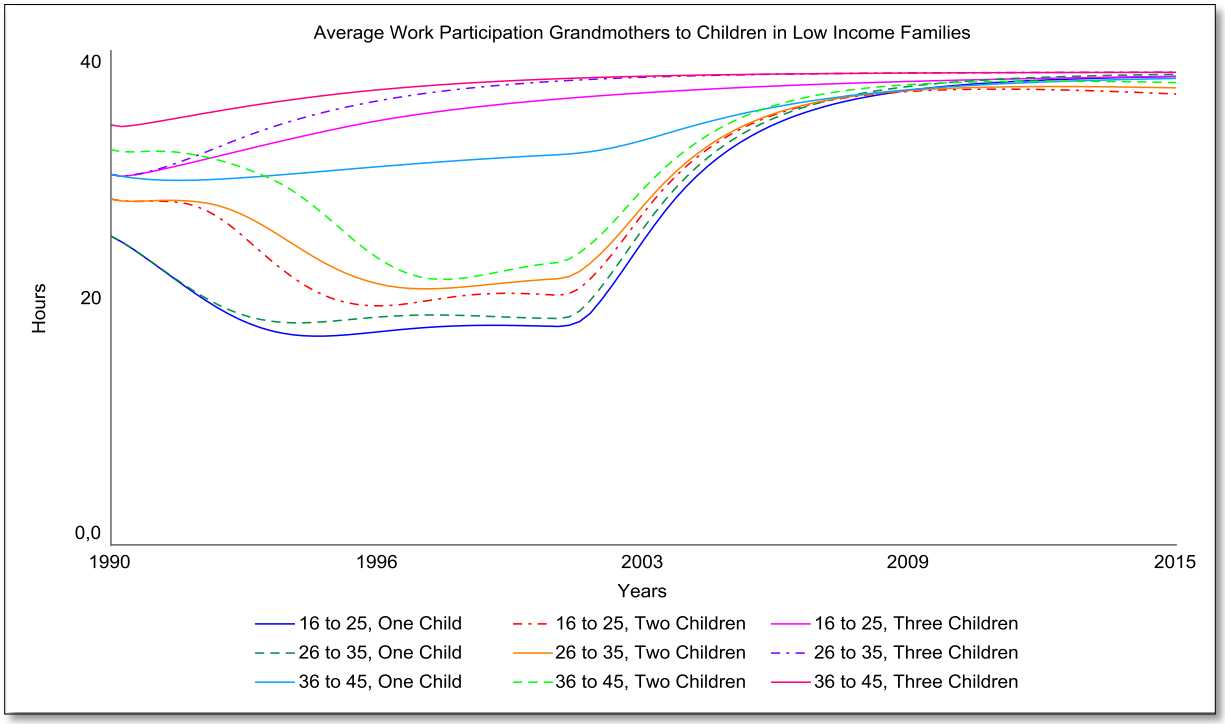

Figure 9 – Average work participation grandmothers to children in low income families

As the above graphs show, the more childcare hours a grandmother provide, the less hours she spends in paid work. The number of childcare hours provided by grandmothers depend both on the percentage of family income spent on childcare as mentioned earlier, but also on the age group the mother belong to younger mothers are more likely to have younger mothers

themselves. In addition, the number of grandchildren present will impact on the childcare hours covered by grandmothers as it can be both difficult and tiring caring for several children below school age at the same time. In figure 8 we can observe that grandmothers in low income families provide extensive number of childcare hours and that these hours drop in response to the subsidised childcare hours available from year 2000. In figure 10 we see how the grandmothers work participation becomes adjusted to the fewer hours of childcare provided, and thus work participation increase in response. Still, grandmothers continue to provide some hours of childcare.

Medium and high income families respond slightly differently to the subsidised childcare hours than low income families. This is due to the percentage of family income spent on childcare being much smaller than in low income families (in most of the cases). When considering figure 10 and 11 in comparison to figure 6 (which showed percentage of family income spent on childcare in low income families) it is notable that, in none of the sample families of medium and high income, the percentage of family income spent on childcare reaches 100 percent.

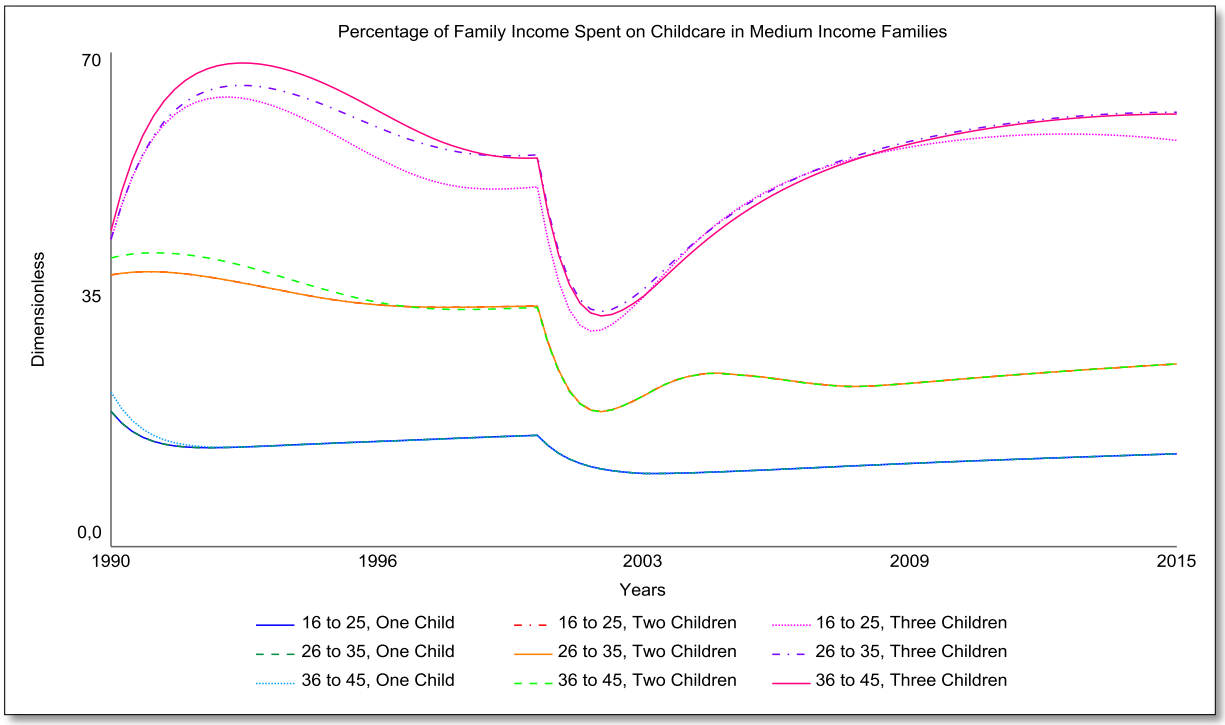

Figure 10 – Percentage of family income spent on childcare in medium income families

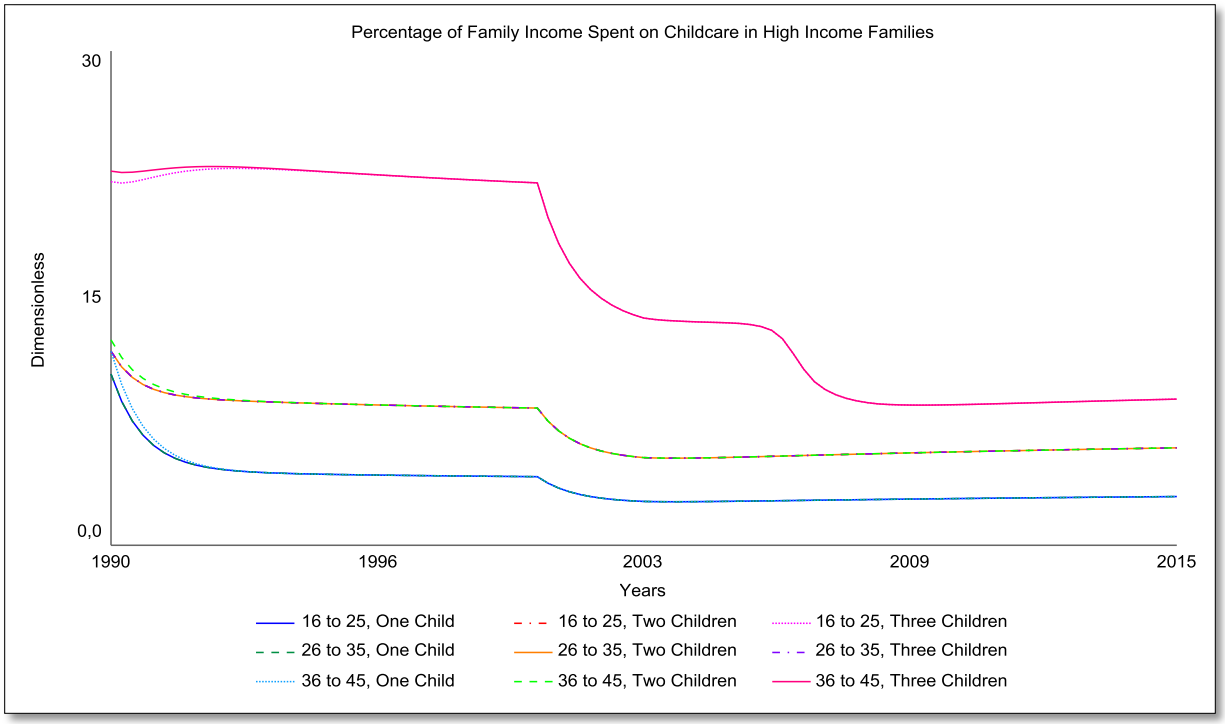

Figure 11 – Percentage of family income spent on childcare in high income families

Since the percentage of family income spent on childcare is smaller in medium and high income families, the work participation of mothers and grandmothers are higher in these families. However, medium income mothers with two or three children under school age have very low work participation compared to mothers with only one child. This is due to the "childcare costs fraction" which divides the childcare costs over income to give an effect on the "self financed work hours available". In the case of medium income mothers, the rise in childcare costs that come with any additional children above one, cause such a large increase in the "childcare costs fraction" that it does not pay to work any additional hours than those that can be accessed with no cost, through grandmothers care hours or subsidised childcare hours. This effect can be observed in figure 12.

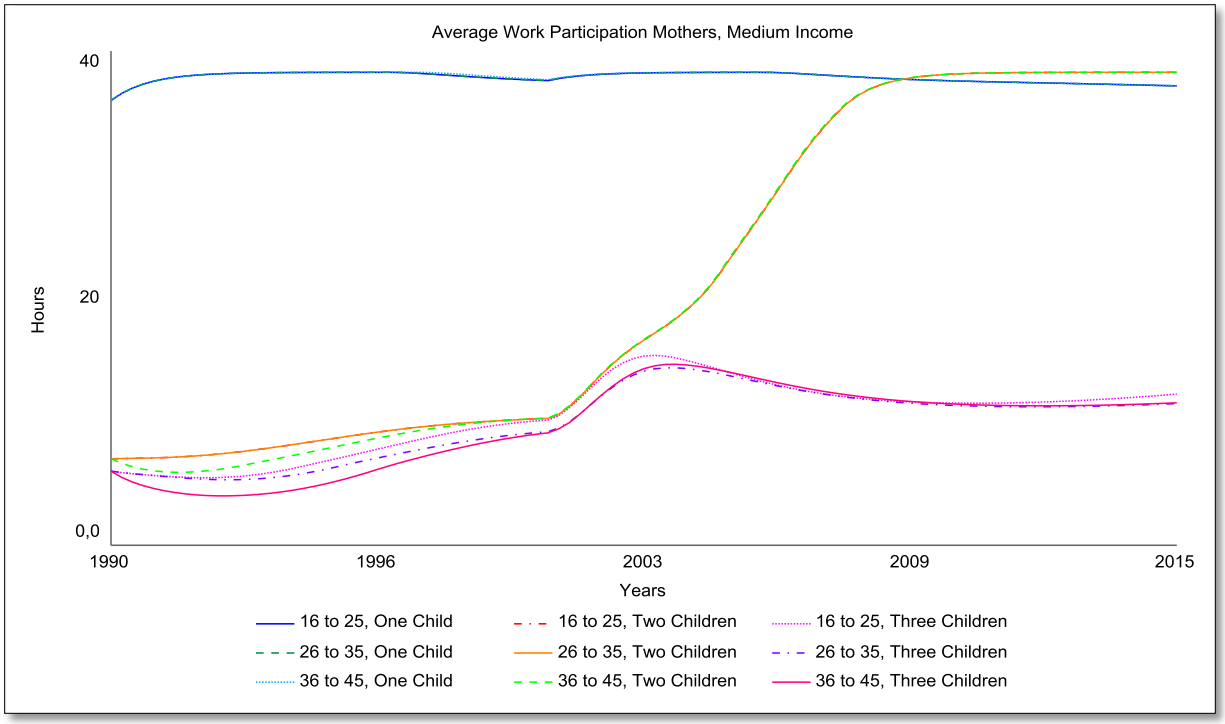

Figure 12 – Average work participation mothers of medium income families by age group and number of children

In the case of high income families, subsidies have little effect on the work participation of mothers with one or two children as their income sufficiently cover formal childcare and thus their work participation is already high. However, mothers in this group with three children have very low work participation in the years before subsidies start as can be observed in figure. This is due to the assumption that grandmothers in high income families provide the least informal childcare, in combination with the total cost of three children in formal care being close to the average weekly income for mothers in this group. Thus, subsidies has a large effect on high income mothers with three children as the 15 hours per child brings the cost down to a level where these mothers has a large financial incentive to partake in paid work due to their high hourly wages.

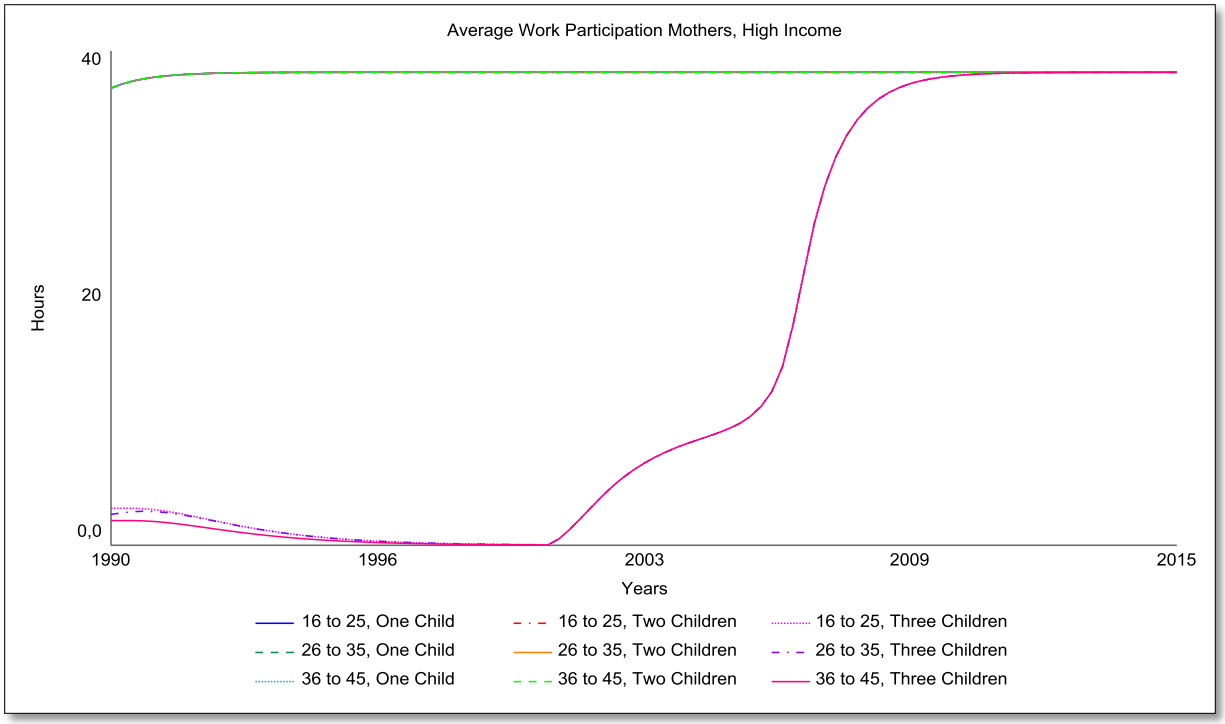

Figure 13 – Average work participation mothers of high income families by age group and number of children

Grandmothers in medium and high income families provide fewer hours of childcare than grandmothers in low income families. Still, some of the medium income families do rely on the free hours of childcare accessible through grandmothers. As we can observe in figure 14, the grandmothers in medium income families with more than one child below school age provided a significant and increasing number of childcare hours in the period before subsidies started. After the 15 hours of subsidised childcare became available in year 2000 the numebr of childcare hours provided by grandmothers in the above mentioned families drops dramatically. Yet, when taking a closer look at the graph in figure 14, it is notable that for families with three children the childcare hours provided by grandmothers starts to rise again after only a few years of subsidies. As the actual childcare hours provided by grandmothers impact on the work participation of grandmothers, the behaviour discussed above is reflected in the work participation of grandmothers in medium income families which can be observed in figure 15.

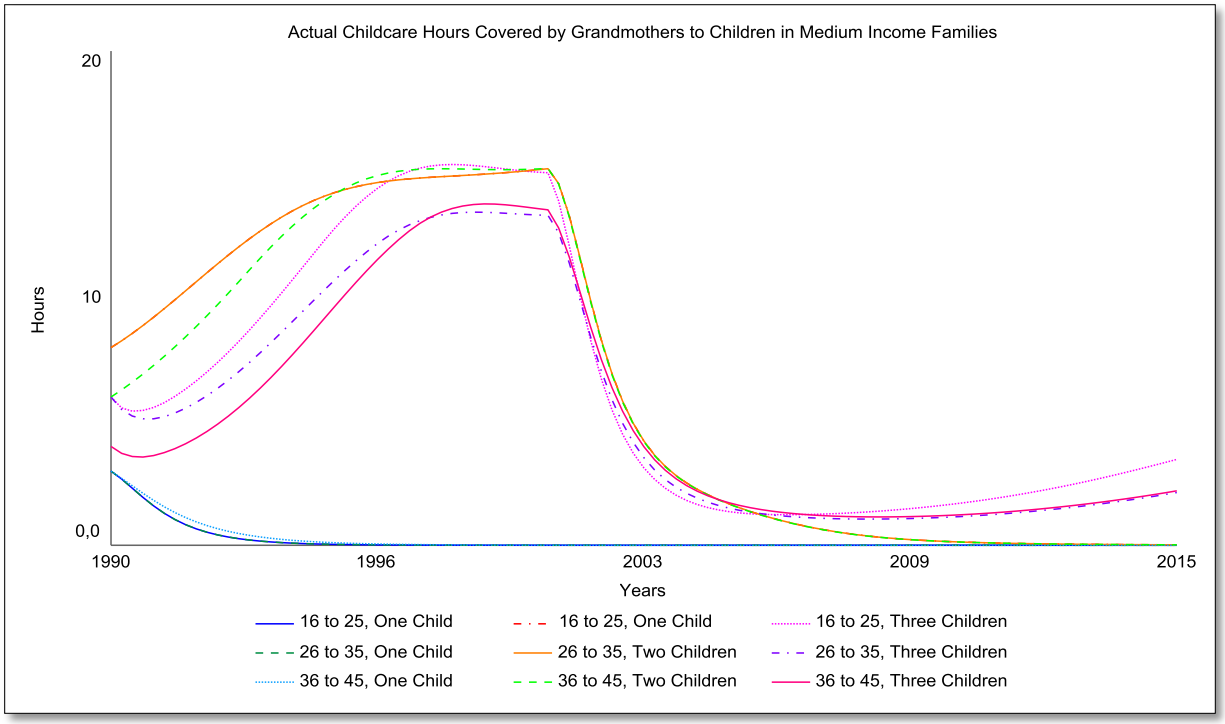

Figure 14 – Actual childcare hours covered by grandmothers to children in medium income families by age group and number of children

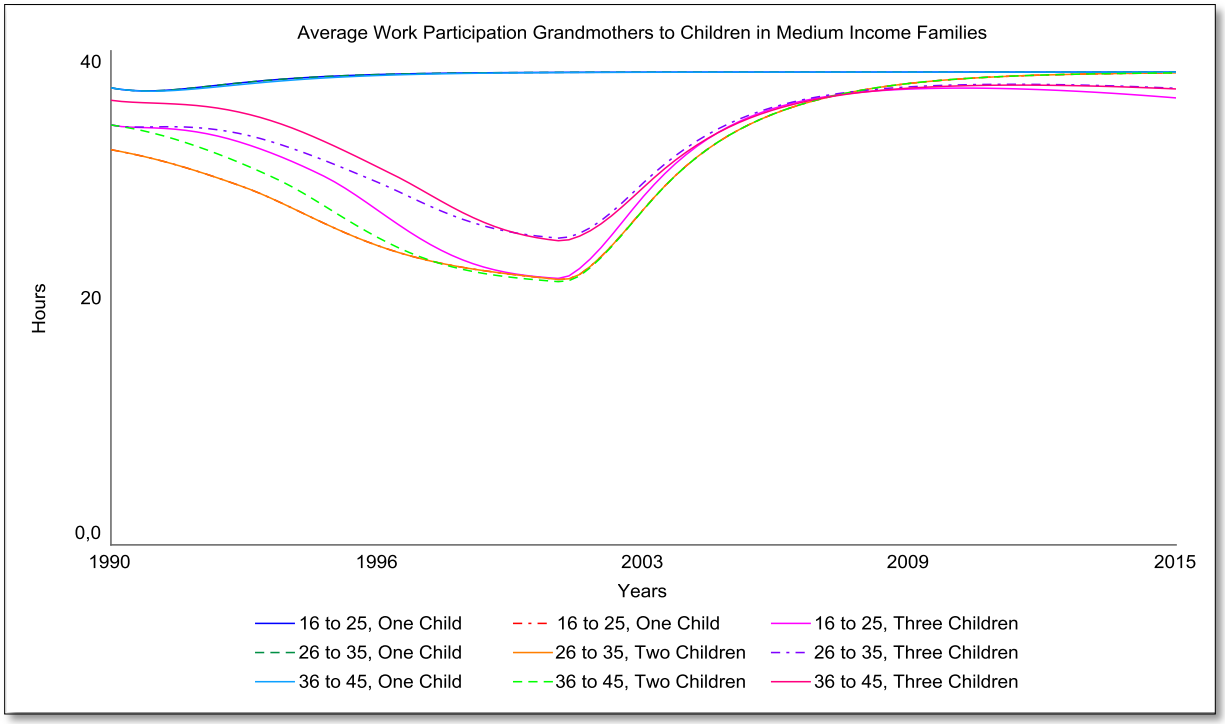

Figure 15 – Average work participation grandmothers of medium income families by age group and number of children

The childcare subsidies have little or no effect on the work participation of grandmothers in high income families, as they do not provide much childcare since the income levels in these families are too high to provide an incentive for grandmothers to reduce their hours. In figure 16 below we can observe how the initial level of work participation vary slightly, due to the estimated initial values of childcare provided, before the average work participation for all groups stabilise at full work participation.

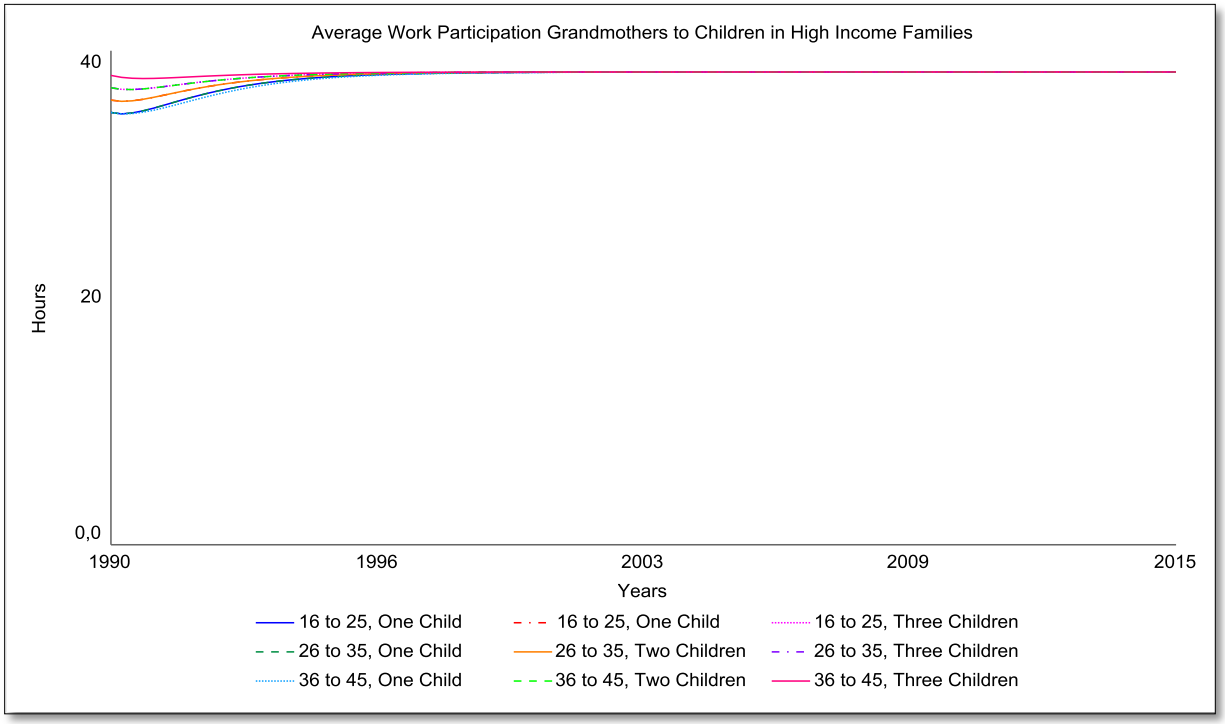

Figure 16 – Average work participation grandmothers of high income families by age group and number of children

The impact of subsidies

The results presented through the graphs show that the work participation of mothers and grandmothers in certain family types were more affected by the childcare subsidies than women from other family types. More specifically, mothers and grandmothers of low income families, mothers with two and three children in medium income families and mothers with three children in high income families saw the most benefit in the years after the subsidies were introduced. The work participation behaviour of the mothers in these families can be observed in the example found in figure 17 that shows the age group 26 to 35, in the families with the largest response to the policy.

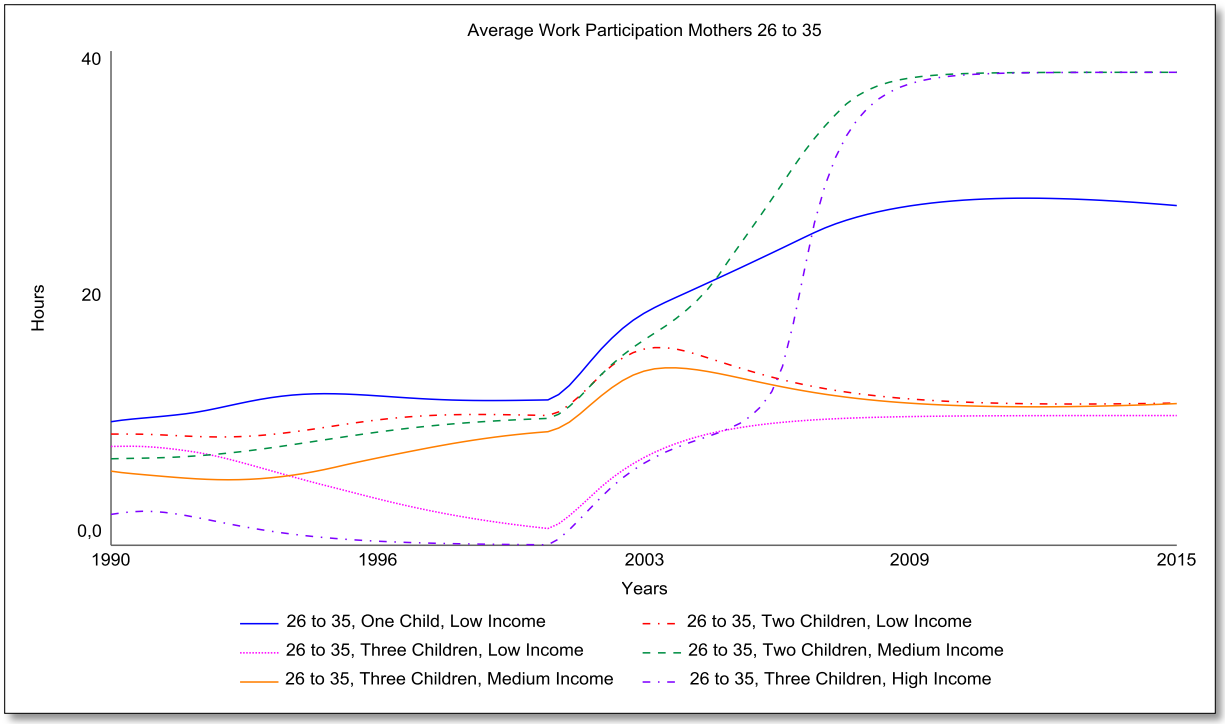

Figure 17 – Average work participation mothers aged 26 to 35, families with largest response to policy

Note that, in the example from age group 26 to 35 in the figure above, it is the mothers of two children in medium income families and mothers of three children in high income families that have the largest increase in work participation in response to policy. These findings suggests that the policy of subsidised childcare hours do not work satisfactorily for the families that needs it the most, namely all low income families and medium income families with three children.

Discussion

The model is built to illustrate the relationship between FLFP at different stages of women's lives, namely during the years of rearing children below school age and as grandmothers later in life. The CLD presented in figure 18 shows the three major feedback loops that together govern the relationship between mothers and grandmothers labour force behaviour.

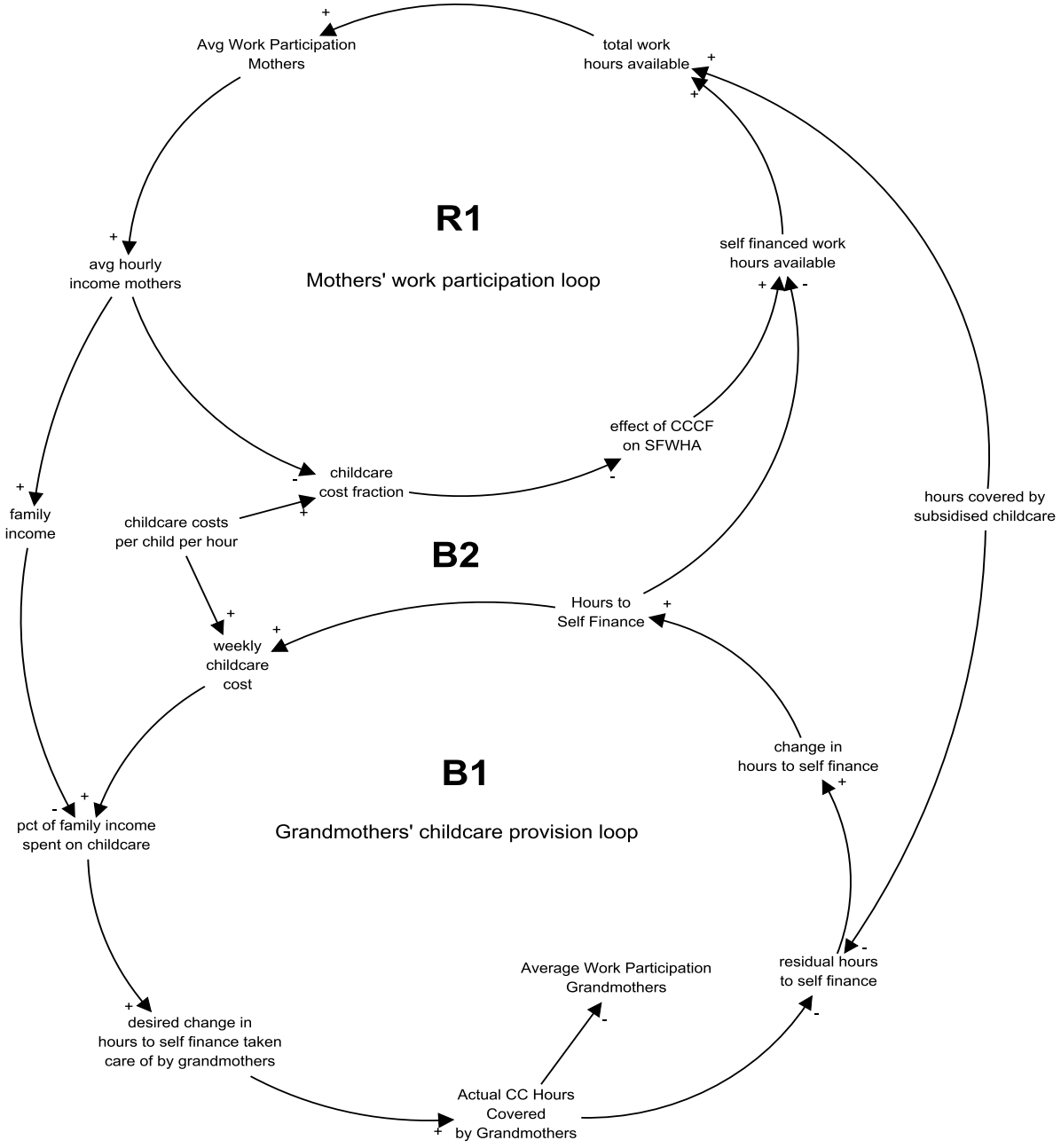

Figure 18 – Simplified causal loop diagram

The loop named R1 is a reinforcing feedback loop that illustrates how an increase in mother's available work hours through subsidised childcare, leads to higher income per hour based on the assumption that a full-time job pays better than part-time. An increase in income reduces the "childcare cost fraction" which works as a comparison of the hourly costs for childcare with the hourly income of mothers. The "childcare cost fraction" has an effect on the self financed work hours a mother has available under the assumption that, if a mother earns the same per hour as it costs for childcare, she will not have any self financed hours available, as it would not pay for her to work those hours. An increase in the "effect of CCCF on SFWHA" causes an increase in the "self financed work hours available" and hence an increase in the

"total work hours available", this again leads the "average work participation" to increase and yet again the "average hourly income mothers" will rise.

The second loop is a major balancing loop, B1, which illustrates the provision of informal childcare by grandmothers. Here, the "desired change in childcare hours provided by grandmothers" is influenced by the "percentage of family income spent on childcare" which aims to represent the decision rule that grandmothers provide childcare hours in correspondence with the financial situation of her family. The "desired change in childcare hours provided by grandmothers" is also influenced by the "actual childcare hours covered by grandmothers"; an increase in the "percentage of family income spent on childcare" triggers an increase in the "desired change in childcare hours provided by grandmothers" which in turn increases the "actual childcare hours covered by grandmothers". The increase in "actual childcare hours covered by grandmothers" leads to a reduction in "average work participation grandmothers".

The two major loops described above interact through a large balancing loop, (B2 in figure 19). This loop influences the "desired change in childcare hours provided by grandmothers" through the impact a change in "average hourly income mothers" has on "family income" and, therefore, also on the "percentage of family income spent on childcare". As the "percentage of family income spent on childcare" is reduced by the reinforcing behaviour found in R1, the "desired change in childcare hours provided by grandmothers" goes down and triggers B1 to a drop in "actual childcare hours provided by grandmothers". As a drop in free childcare hours provided by grandmothers mean an increase in the hours parents need to self finance, the "hours to self finance" increase and causes a reduction in "self financed work hours available", thus the reinforcing behaviour of R1 is staggered by the balancing behaviour of B2.

Political decisions relating to social policy and childcare policies in particular, have considerable consequences for UK women's ability to participate in paid work. The policies implemented since New Labour came to power in the late 1990s have all clearly been inspired by policies found in the Nordic countries, yet the results in terms of increased FLFP are nothing close to the levels reached in the Nordic countries. Taking a closer look at how the childcare policies differ in the Nordic countries in comparison to the UK, there are two factors that dramatically stand out, namely the level of subsidies in relation to family income and how the childcare is delivered to the market (Ostner et al., 2008). The first of these factors, the level of subsidies in relation to family income is present in the system dynamics model used for this study. The rise in costs of childcare during the period 2000-2015 seem to have limited the benefit of subsidised childcare hours significantly as the percentage of family income spent on childcare keeps increasing instead of decreasing (or remaining stable). The large percentage increase in childcare costs, which by far outweighs growth in wages in the period, amplifies the argument made by Rutter (2016) that the supply and demand functions in the childcare market does not work sufficiently.

Although the childcare policies implemented in the UK in theory are valid policies as a means to solve the supply/demand issues, the policies fail due to the fact that state funded childcare

does not outweigh price increases in the sector, as demand is much higher than supply, and as such push the prices upwards. The fixed hours of subsidised childcare available to families in the UK was intended as a means to increase FLFP in the process of combating child poverty. Unfortunately due to the fault in the market supply/demand mechanism, the fixed subsidised childcare hours in the period of analysis only helped stagger the negative effects instead of resulting in positive changes to behaviour.

Conclusion

The aim for this study was to use system dynamics to analyse how subsidised childcare hours impact on the FLFP of mothers and grandmothers. The model developed for this purpose is a simplified representation of reality, and as such, does not consider all aspects that affect mothers and grandmothers work participation decisions. Yet, the results suggest that the model provides useful insights into the labour force behaviour of UK mothers and grandmothers. Although childcare subsidy policies, in for instance countries like the Nordics, have proven effective in raising female labour participation; the policies available in the UK have been critiqued of being delivered through unnecessarily complicated systems. This, together with the highest childcare costs in Europe (despite the policies), creates an environment where take up is limited to those who can afford the additional cost or access free informal childcare; where the mothers in families who need the second income the most still cannot afford to work.

The limited scope of this study leaves the model with a range of limitations and in light of this, future research is needed. The system dynamics model in its current state of development only provides insight into a few aspects that affect FLFP and family income. By modelling the policy endogenously, one could potentially conduct a much more advanced analysis. There could be great potential in adapting the model to the national economy level to show how FLFP impact on the country's overall labour force and economy, and how the economical and political context influences social policy measures. Any future research on the topic could with benefit investigate at what level subsidies will give greater effect for the low and medium income families, who are relying on mothers bringing in a full second income. In addition, any future research that comprises policy analysis should consider how the delivery and implementation of subsidised childcare hours can be simplified in order to improve uptake.

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