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Formal and Informal Long-term Care Provision: A Comparative Analysis in European Context

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Abstract: The prevalence of ageing population and growing old-age consumption per capita has raised concern about the fiscal burden of state and family. As individuals age, they have increasing need for assistance in activities of daily living (ADL). Therefore, long-term care makes up the most in the consumption of elderly. State and family are responsible to meet this demand and the care distribution depends on the welfare regime of the country. Using the typology of welfare regime framework, this thesis aims to find interaction between formal and informal sector of long-term care giving to old-age. Applying binary logistic regression, the results show that the likelihood of giving informal care is higher but the likelihood of giving high intensive care is lower when the long-term care expenditure increases. Approaching long-term care by time intensity, this study supports the specialization hypothesis in which the state complements informal care but substitutes high intensive care.

Key words: Long-term care, Informal care, Formal care, Ageing Population, Welfare regime

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1 Introduction

1.1 Motivation

Recent global demographic trend has witnessed an ageing population. In 2017, the share of population aged 60 and above was 13 percent (962 million) of the world population and the share is growing rapidly. By 2050, the projection of old people is estimated to be 2.1 billion (UN, 2017). Ageing population was first driven by fertility decline until late 20th century. In the current period, a decline in old-age mortality brings about increasing life expectancy (Bengtsson & Scott, 2011). An improvement in life expectancy has increased the fastest over the last two decades with a gain of 5.5 years. In 2016, the world average life expectancy at birth was 72 years and is projected to reach 77 years in by 2045 (UN, 2017).

Population ageing has an implication to the society in several aspects and concerns were raised with regard to the consequences in old-age security, intergenerational relations, demand for goods and services, care and support to elderly. Although a longevity gain reflects a medical breakthrough and improvement of economic well-being, it does not assure additional year of healthy life (OECD, 2017).

In particular, health and social care cost is addressed as a challenge brought by population ageing. Evidence from National Transfer Account reveals that per capita old-age health consumption rises with age, especially in developed countries, more importantly, it is growing over time (Lee, 2015). By and large, frail elderly has an increasing demand for long-term care (LTC) which refers to help in day-to-day basis. Prevalence of both growing share of old-age and increasing old-age health consumption per capita implies a multiple increase in health care expenditure. Increasing demand for health care both per capita and aggregate therefore bring about fiscal burden to public sector and intergenerational relations.

Public expenditure to old-age concerns two elements: pension and health and social care. The provision of pension is based on a system of individual contribution and remain more or less stable for the entire years of old-age. On the other hand, health and social care by the public seems to be more problematic as they are not provided based on amount of tax paid by individual. The challenges facing by the state is that given the budget constraint, how to supply the increasing needs for health and social care and still maintain good quality care for everyone (Lindgren & Lyttkens, 2010). This issue is the most prevalent in countries with strong welfare state provision where public health and social care services are comprehensive.

In contrast, the intergenerational transfers are provided by family, friends, children or spouses. Similar to financial private transfer, the provision of informal care can be perceived as time transfer (Vargha et al., 2017). One distinctive feature that deviate informal care from formal care is that informal care is unpaid, and this applies to both childcare and elderly care. However, the informal care is not free from cost. Beside from indirect cost, the family

members also confront with indirect opportunity cost. Traditionally, informal carers are mostly women in the household. Although, the recent decade has witnessed an increasing female labor force participation, much of the care are still done by women. Thus, the allocation of time is a tradeoff between employment and caregiving.

To what extent the cost and elderly care burden are shared between public and family largely depends on the institutional setting and how the funding of old-age health care is organized. Using the typology of welfare regime as a framework, this thesis aims to examine the interaction between state role and family role in giving LTC to frail elderly. Among other types of health care, highest growth has seen in LTC and it is highly connected to the increasing demand for care by elderly. In addition, LTC also involves the family role more often than not. Thus, in light of ageing population, LTC deserves an investigation.

Literatures regarding the interrelation between state and family in providing welfare to elderly has found to be inconsistent or even contradicted. On one hand, the state provision of care is assumed to substitute the informal care provision (Charles & Sevak, 2005; Fukuyama, 2000; Greene, 1983; Lo Sasso & Johnson, 2002; Van Houtven & Norton, 2004; Van Oorschot & Arts, 2005; Wolfe, 1989). On the other hand, some other research suggests the opposite in which formal and informal care are complementary (Daatland, 2001; Holly et al., 2010; Kohli, 1999; Künemund & Rein, 1999; Langa et al., 2001; Motel-Klingebiel et al., 2005). Furthermore, beside from these two competing hypotheses, another set of literature found evidence that both hypotheses apply when considering the task of long-term care by amount of time given or types of care being performed (Bolin et al., 2007; Brandt, 2013; Brandt et al., 2009; Verbakel, 2017).

The interaction pattern between state and family is an important issue to understand how care responsibility is distributed between these two sectors. When the pattern is shown to be inconsistent across studies, the implication of care burden is therefore inconclusive and thus calling for a further inspection.

1.2 Aim and Scope

The main objective of this research is to look at the interrelation between formal and informal care given to elderly. Extensive number of previous cross-country analysis literatures regarding the association between formal and informal care based their studies on Survey of Health, Ageing and Retirement in Europe (SHARE) (Albertini et al., 2007; Barczyk & Kredler, 2018; Bolin et al., 2007; Brandt, 2013; Brandt et al., 2009; Haberkern & Szydlik, 2010; Igel et al., 2009; Kohli & Albertini, 2006) and their data are limited to respondents age 50 and over. In this study, data from European Social Survey (ESS) are employed which allow an expansion of age to arrange between 15 -104. By doing so, we can examine the possibility of giving informal care by younger age.

To my knowledge, data from European Social Survey has only been used by Verbakel (2017) for similar purpose. In his study, care intensity has also been classified to assess the level of informal care provision. Unlike Verbakel (2017), this study uses different definition of intensive carers by following the classification mentioned in OECD report (Colombo et al., 2011). The respondents are coded as high intensive LTC provider if they spend 21 hours or more per week. Those who provide care less than 21 hours per week are then coded as non-intensive (coded as 0). This also means that the non-caregivers, those who reported “No” in the first questions are not included here.

This contrasts with Verbakel (2017) in two folds. Firstly, the author set a benchmark of intensive care giver as those who provide 11 hours or more per week. Secondly, the non-care givers are included in the non-intensive category. However, the intensity of care can only be assessed when the provision of care does occur. Thus, by raising the benchmark of intensive care eligibility and excluding non-care givers, this study aims to provide a more precise observation that would benefit the analysis.

In addition, Verbakel (2017) assessed the formal care provision by a variable name “Generosity of formal LTC provision which is constructed by combining LTC beds in institutions and hospital, LTC workers, LTC public expenditure and proportion of people receiving LTC. In this study, the comprehensiveness of formal care is instead in used which are LTC expenditure and LTC recipients including as a separated variable in the model. The construction of comprehensiveness follows the discussion in the OECD report (Colombo et al., 2011) in which the formal care provision of each countries differs by different dimensions. For example, country with similar LTC expenditure might not have similar share of LTC recipients. Thus, by separating two dimension of comprehensiveness, this study aims to investigate whether these two variables should impose similar effect to informal care.

Lastly, Verbakel also paid attention to the cultural context effect. The variable in used is “Family care norms” which taken from European Values Study. This variable is an aggregate value meaning that individuals from the same country are assumed to share the same cultural values which might not always be the case as the care norms can also be subjective. In addition, cultural variable deserves a careful interpretation as it also has a dynamic over time. In this paper, norms and attitudes are selected from the questionnaires in the survey which include two aspects: attitudes in giving care and attitude towards strong role of state. By doing so, the study aims to explain the norms and attitude that are reflected more precisely at individual level.

1.3 Research Problem

To assess the relationship pattern, the following research questions are formulated:

RQ1: What is the association between comprehensiveness of public LTC and likelihood of giving informal care?

RQ2: What is the association between comprehensiveness of public LTC and likelihood of giving informal care in which the care tasks are highly intense?

RQ3: How do norms and attitudes towards caregiving and role of state impact the likelihood of giving care (both informal and intensive care)?

The total observations are 14,191 of individuals from the following 9 countries, Nordics: Norway, Sweden and Denmark, continental Europe: Austria, Germany, France and Switzerland and Southern Europe: Spain and Portugal. Age boundary is set at 15-104 years old. Each individual is defined as caregivers and non-caregivers. Those who have been categorized as caregivers will be classified further as either high intensive caregivers (21 hours per week and above) or low intensive caregivers (less than 21 hours per week). As the information about giving care will be used as a dependent variable, those who fail to identify themselves or missing data are excluded.

1.4 Outline

In section 2, the background related to long-term care, typology of welfare, familistic view and comprehensiveness of public provision are presented to give general ideas about the interaction between state, family and market in care giving. Previous researches and hypotheses are included in this section. Section 3 discusses about data collection, choice of variables based on background and previous research. Section 4 presents methodology model specification. Descriptive statistics and regression results are found in section 5, followed by discussion in section 6. The study ends with conclusion in section 7.

2 Theory

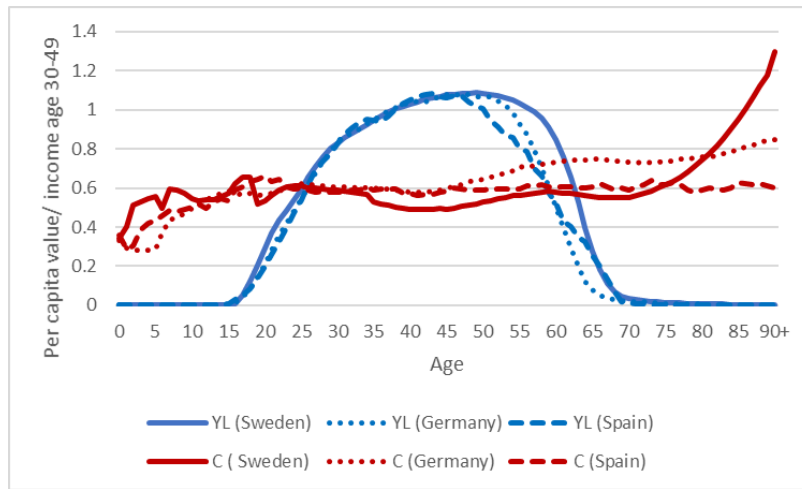
2.1 Background

2.1.1 Economic Life Cycle and Old-age Consumption

According to the economic life-cycle hypothesis, individuals plan their consumption and spending over their life course that is specific to their age. While consumption occurs at all age, the labor income is earned only during the active year of life. To understand the balance between consumption and production, Life Cycle Deficit (LCD) is expressed as consumption minus labor income ($C - YL$). During working age, individuals earn labor income and produce more than they consume, thus they are having lifecycle surplus. In contrast, children and elderly encounter higher consumption than labor income, thus, having life cycle deficit (Vargha et al., 2017).

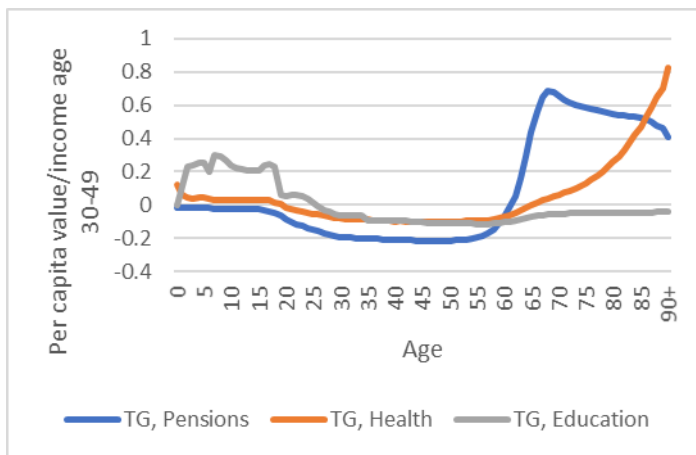
During the dependency age (children and elderly), consumption needs to be financed by means other than labor income such as public transfer, private transfer or asset-based reallocation. Data from National Transfer Account (NTA) have demonstrated per capita age-profile consumption and labor income which can also imply life cycle deficit. Figure 1 depicts cross-country comparison of different welfare regimes. The age-specific labor income suggests that age entering labor market is similar for all countries while a gap is observed for retirement age. Consumption on the other hand shows a striking divergent pattern at old age in which elderly consumption increases exponentially in Sweden, remain stable in Spain and Germany is in the middle. Partly, the increase in consumption with age reflects health care public provision, availability of public service and living arrangement (Lee & Mason, 2011).

Figure 1: Age-specific labor income and consumption profile Sweden (2003), Germany (2003) and Spain (2000)

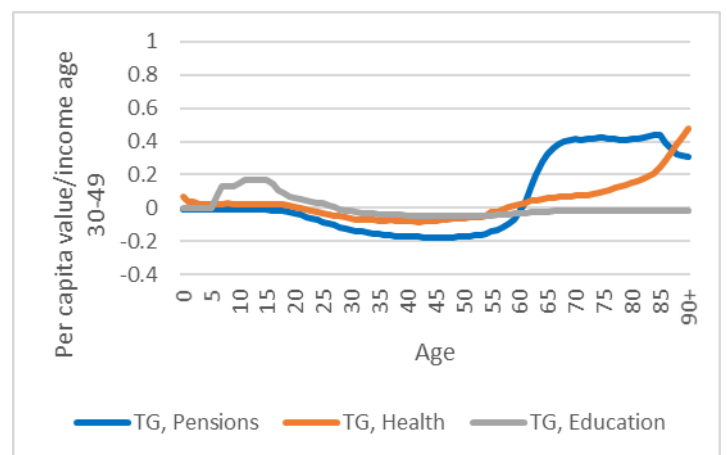


Source: Own calculation, data retrieved from National Transfer Account (NTA) project (2016)
 Note: Labor income and consumption values are normalized using age group 30-49

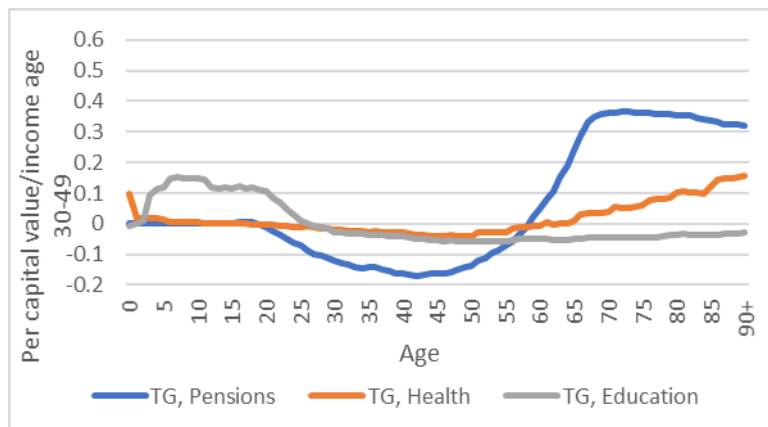
Figure 2: Age-specific Public Transfer by Purpose



Panel A: Sweden (2003)



Panel B: Germany (2003)



Panel C: Spain (2000)

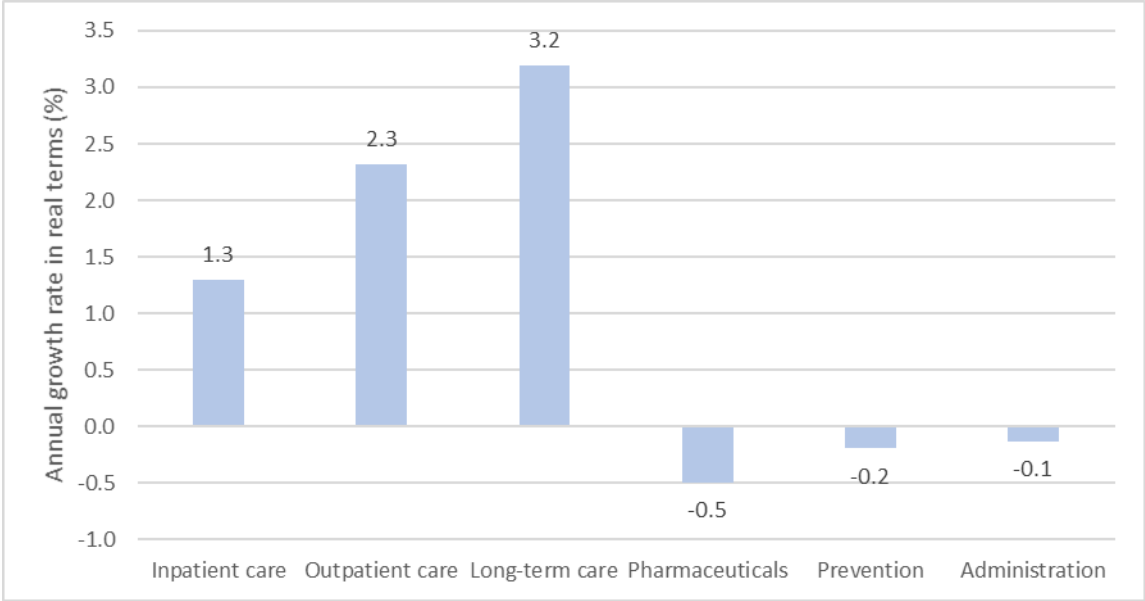
Source: Own calculation, data retrieved from National Transfer Account (NTA) project (2016)

Figure 1 provides general understanding of total consumption by different age in different country. In figure 2, we can observe age-specific pattern when public transfer is identified by purpose. Apparently, public transfer to children is largely explained by Education. Pension transfer increases sharply during the onset of retirement age but remain rather stable or slightly decrease thereafter. Public health transfer, on the other hand, clearly increases with age in all country, even in relatively low public expenditure like Spain.

Statistical evidence has shown that health care cost is the main concern for expenditure at old age. However, the effect of age on health care expenditure is found to be inconclusive in the previous researches. The empirical evidence supports the effect of age assumes mute influence of longevity on age-health expenditure relationship (Longman, 1987 cited in de Meijer, 2012). In addition to age, the contradicting literatures consider cost-of-dying and health care cost between survivors and decedents. Their empirical results suggest that age has a moderate effect on health care expenditure but strong effect on LTC expenditure (Madsen et al., 2002; Spillman & Lubitz, 2000; Yang et al., 2003). Similar results are found in literature using time-to-death (TTD). Controlling for TTD, the age effect on all service of health expenditure diminish but age remains the strong determinant of LTC spending (de Meijer, 2012; Häkkinen et al., 2008; Weaver et al., 2009; Werblow et al., 2007).

The consequence of ageing on health care expenditure therefore needs a careful look into LTC spending. Moreover, increasing of health expenditure growth is dominated by the LTC portion. In figure 3, growth of health expenditure is classified according to function. Obviously, over 2003-2015, the LTC expenditure growth for OECD average is 3.2 percent which is the highest among other functions.

Figure 3: Growth rate of public health expenditure by function, OECD average 2003-2015



Source: OECD Health Statistics (2017)

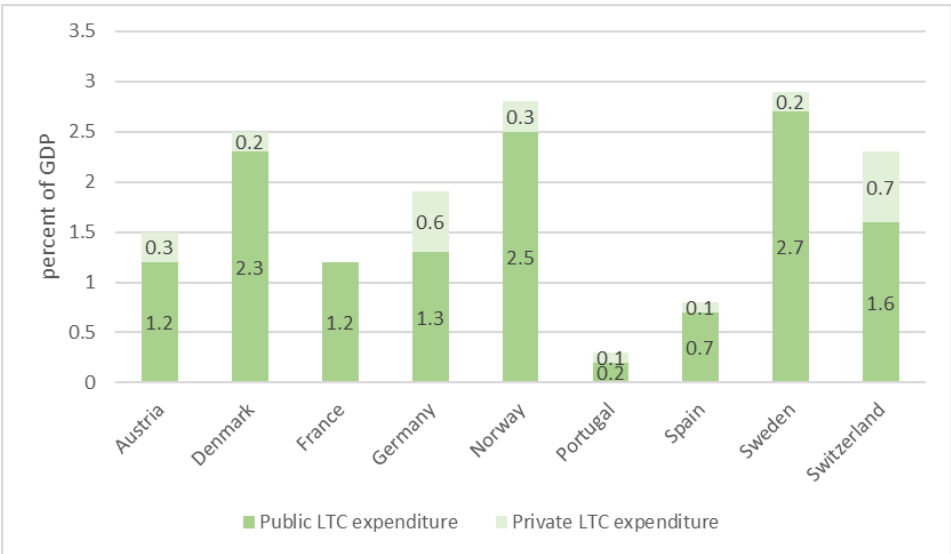
2.1.2 Long-term care (LTC)

According to the System of Health Account (SHA) by OECD (2011), LTC refers to medical and personal care services to patients with long-term dependency aiming to reduce health deterioration. LTC components are divided into social and health. The health category can be distinguished further in to 4 components which can be perceived by level of intensity. The first component of LTC is the medical/nursing care. It involves service such as medical diagnosis, wound dressing, small surgery. The purpose of these services is to relieve pain and maintain functionality. The second element is personal care services given to patients who are in need of help with activities of daily living (ADL) such as eating, bathing, dressing, getting in and out of bed and using toilet (Huber & Hennessy, 2005). Patients needing helps in ADL is due to their illness or disability. The third component is assistance services that facilitate individuals to live independently in their residences. Such care is known as Instrumental activities of daily living (IADL). The cares mostly deal with management in the household such as cleaning, grocery shopping, housework, financial management. Lastly, the social LTC provides social care service associating with community level such as occupational support. This service is considered to be care within socializing and leisure. When discussing LTC, health components received more attention as it has an age-characteristic than the social component.

Although, LTC service applies to disabled at all age, the recipients are mostly elderly. For OECD, the share of LTC recipient age 80 and above is more than 50 percent pointing the fact that old-age require more day-to-day help. LTC provision can be given by informal carers such as family and formal carers. Country’s welfare regime also defines the private cost sharing, service coverage, benefits and eligibility. The following paragraph will discuss issues relating to LTC in details.

- LTC expenditure

Figure 4: Public and Private LTC expenditure as a share of GDP by country, 2015



Source: OECD Health Statistics (2017)

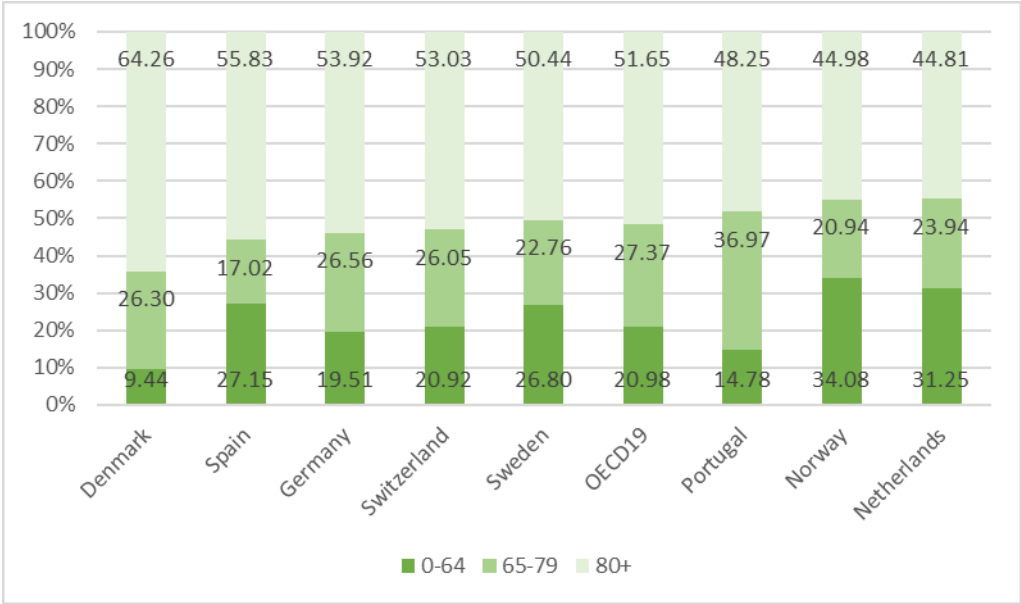
Note: Public expenditure includes government and compulsory schemes. Private expenditure includes voluntary schemes and household out-of-pocket payments.

Figure 4 conveys level of LTC expenditure as a share of GDP. The total LTC expenditure in Denmark, Sweden, Norway and Switzerland are among the highest of above 2.3%. For Spain and Portugal, the total LTC expenditures are accounted for less than 1% of GDP. Considering the expenditure by financial schemes, substantial shares of LTC are paid by public spending-government and compulsory schemes. For similar level of high total LTC expenditure, a distinction between the Nordics and Switzerland is observed. The high total LTC spending in Denmark, Sweden and Norway is predominantly explain by the public scheme and the private spending shows only minor contribution. For the case of Switzerland, the private scheme constitutes of 0.7% which is comparable to Germany. The private spending on LTC for other countries are kept at 0.3 and below.

The variation across countries can be explained by several factors. Although the previous literature has proved that age is a strong determinant to LTC expenditure, it is too simple to conclude that the country variation solely depends on the proportion of elderly in the society. The share of elderly in the country indeed influences the expenditure, however, the development of public care provision as well as the cultural context towards familistic values should be taken into account when explaining the country’s differences (Huber & Hennessy, 2005; Colombo et al., 2011; OECD, 2017)

- LTC Recipients

Figure 5: Share of formal LTC recipients by age, 2015



Source: OECD Health Statistic (2017)
Note: Data for Denmark, Portugal and Netherland refer to 2014

From figure 5, a substantial portion of LTC recipients are the oldest-old group of age 80 and above followed by those in age group 65-79. The age group 80 and above, beside from being the main users of LTC, they are also expected to increase in number. For OECD average, the share of oldest-old is expected to be 9.4% in 2050. Although ageing is not the only factor explaining the growth in LTC expenditure, having a greater share of oldest-old group would definitely pressure the demand for LTC in the future more or less (Colombo et al., 2011).

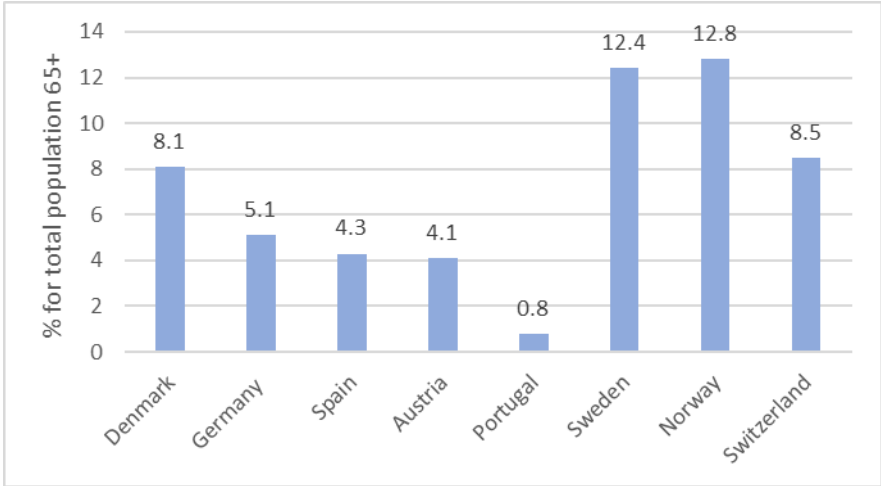
From the policy perspective, number of formal LTC recipients can also reflect the structure of public care provision regarding entitlement and eligibility criteria. For example, a mean-tested program put a screen on the eligibility and filter out individuals that do not meet the requirement. Hence, they are not entitled to receive formal LTC and therefore do not reflect in the aggregate number of LTC recipients (Huber & Hennessy, 2005).

- LTC providers

Formal caregivers

Formal caregivers are defined as qualified professionals, typically nurses and personal carers who have been trained and licensed to provide cares. They perform tasks depending on their professional qualification to patients facing ADL. The formal LTC by the professionals can be given at home or institution which is determined by the design of the public program (Triantafillou et al., 2010).

Figure 6: Formal LTC workers (nurses and personal carers) as percentage of total population aged 65 years old and over, 2015



Source: OECD Health Statistic (2017)
 Note: Data for Denmark refers to 2014

The number of LTC workers is a reflection from supply side as a response to increasing number of elderly which in turn drive the demand for LTC. From figure 6, the number of LTC workers show a great divergence in which 12.8 percent is found in Norway while it is as low as 0.8 in Portugal.

Profile of formal carers are middle-aged women who also often work part-time (Colombo et al., 2011). To responses to the increasing need of LTC, foreign-born workers is also a possible option observed across European countries. The immigrant care worker in Northern European countries are employed by formal sectors such as community service. On the other hand, immigrant care workers in southern and central European are private hired by family. For example, in Italy, large number of foreign-born workers are employed to provide LTC of frail old family members. The prevalence of immigrant workers does not only reflect the increasing demand of care but also time conflict between employment and care in the countries with limited formal care provision (Lamura et al., 2010).

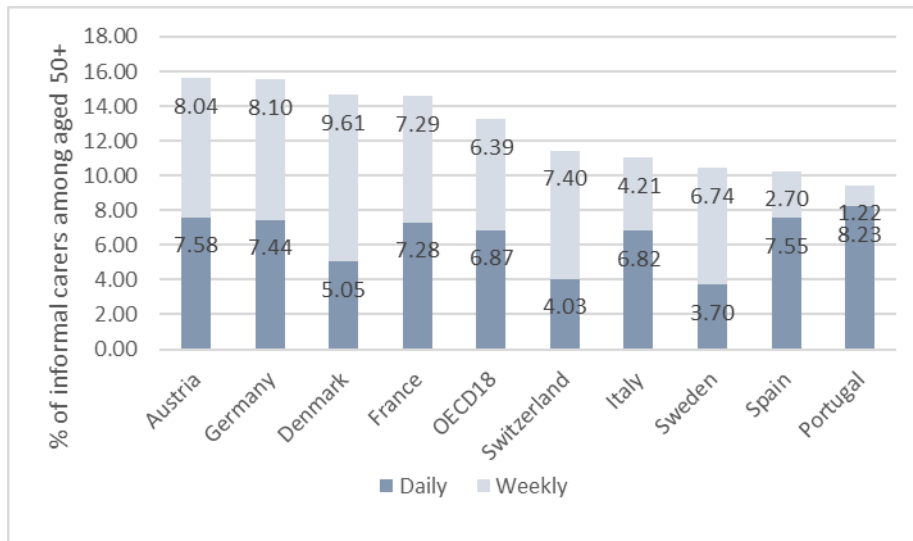
Informal caregivers

Despite availability of public LTC provision, elderly in OECD still rely on help from informal source such as their family, friends, relative, spouses or neighbors. Informal carers are therefore unpaid and non-professionals covering wide range of tasks that might overlap with the tasks performed by formal carers. (Triantafillou et al., 2010).

At the individual level, the informal care provision is motivated by the demand of care receivers, opportunity structures and emotional bond. Considering the care demand, family members provide functional solidarity to elderly in need such as help with ADL. Opportunity structures refers to what extent the carers can allocate time between employment, leisure and cares. The emotional bond involves cares given based on affection, trust, respect and reciprocity norms (Bengtson & Roberts, 1991; Igel et al., 2009).

Individual choice in giving care regarding opportunity structures and affection are also propelled by the factors at macro level specially within the institutional setting and cultural context (Colombo et al., 2011). Variation of informal caregiving at country level can be perceived from figure 7. The cross-country comparison requires an understanding of welfare regime characteristics which will be explained in the next section.

Figure 7: Population aged 50 and over reporting to be informal carers, 2015



Source: Wave 6 of the Survey of Health, Ageing and Retirement in Europe (2015) cited in OECD (2017)

Figure 7 depicts number of informal care providers aged 50 and above. On OECD average, about 13% reported themselves as informal care workers. High proportion of total workers are found in Austria, Germany and Denmark. The figure also classifies cares amount of time spent in giving care measure as either daily or weekly. Sweden, Switzerland and Denmark-countries with well-establish public provision have the lowest share of daily informal care workers. In contrast, the southern European countries such as Italy, Spain and Portugal reveal diverging pattern of daily and weekly care provision. High share of people in these countries reported themselves as daily caregivers, much higher than the weekly portion. For example, the proportion of daily caregivers to weekly caregivers is 8.23 % to 1.22 % (OECD, 2017).

The analysis of informal care providers is relevant to the intensity of care. One way of estimating the intensity is through amount of time spent. A more specific definition of intensive care is a benchmark of 20 hours per week. Using this definition, the statistics deliver similar results as in figure 7. The Nordic countries, less than 20% of informal caregivers provide care of at least 20 hours per week. For southern countries like Spain, 50% of informal caregivers provide cares that are time-intensive of 20 hours or above per week (Colombo et al., 2011).

Care intensity can also be assessed by the tasks that are being performed. Help with IADL such as household work is less time-consuming and more sporadic. In contrast help with ADL such as personal care is more time-consuming, more demanding and provided on a more regular basis. Whether care intensity is measured by time or task, the country variation maintains the same pattern: non-intensive care is most prevalent in the Nordics and the high intensive care is normally found in southern European countries (Colombo et al., 2011; Igel et al., 2009).

One distinctive feature that set boundary between informal and formal care is that informal care provision is unpaid. However, this does not mean that informal care incurs no cost. Generally, informal care is not presented in national health account and rarely documented. Nevertheless, some researchers attempt to evaluate the monetary values of informal care.

Using data from Harmonized European Time Use Surveys (HETUS), Giannelli et al. (2012) have estimated the monetary values of household work and childcare work for 24 European countries. The result shows that the unpaid work in the household accounted for 17%-31.6% of EU GDP. Similar results are confirmed by Vargha et al. (2017). To be more specific on types of housework, Oliva-Moreno et al. (2015) measured the cares provided to disabled living in the same household in Spain. The result reveals that the monetary value of unpaid work is about 1.7 % - 4.9 % of Spanish GDP depending on method used. Despite the variation, the bottomline of these researches is that informal care does incur social cost and it is therefore not free.

The implication of care intensity is imposed on the opportunity structure as mentioned earlier. There exists a tradeoff between informal care provision and labor force participation in which the evidence can be observed internationally (Bolin et al., 2008; Jacobs et al., 2017; Van Houtven et al., 2013). The likelihood of being employed for informal caregivers is less than those of non-care givers (Heitmueller, 2007). Even if they are employed, they tend to be part-time workers. Informal care provision also influences the choice of occupation. As a result, informal care givers are more likely to work in a flexible job and temporary work contract that allow them to allocate time for giving cares. (Colombo et al., 2011)

This conflict in time allocation is the concept explained in economic time allocation theory. Individuals are given a time constraint of 24 hours per day which needs to be allocated to labor supply, leisure and home care. Each of the activities delivers different utility motivated by preference and opportunity. The choice of allocation depends on several factors but mostly the earnings, transfer and life cycle. This also means that the opportunity cost of choosing involves, for example, the higher earning received from labor work indicates a higher opportunity cost of care giving (Jacobs et al., 2017).

Although, an association is found between employment and caregiving, the causality has not yet been confirmed. Nevertheless, evidence from Colombo et al. (2011) allows us to differentiate the association by care intensity. Only when the care is intensive, at least 20 hours per week, does informal care have an impact on labor force participation. In contrast, when time spent in caring is only for a few hours, the caregivers are able to combine the care and work. Consequently, the caregivers do not have to leave the job and thus no earning reduction occurs.

2.1.3 Typology of welfare state

Aside from differences in demographic structure, the country variation, perhaps can be better understood through their institutional setting. An attempt to cluster institutions is first seen in the most cited work of Esping-Andersen (1990), the typology of welfare regime. This framework was first launched to classify democratic developed countries arguing that there exists an interaction between market, state and family that define the different social policies across

countries. To assess the interaction, two key dimensions are evaluated: de-commodification and social stratification (Chłoń-Domińczak et al., 2016).

The de-commodification measures the dependent level of individual on markets. Individuals become commodified if they rely on market to survive. The score of de-commodification thus assessing to which degree can an individual make a living independently of market force. Indicators assessing de-commodification are the eligibility rule and entitlement to social rights. For instance, to what extent the states provide social program to ensure safety against social or economic risks such as sickness allowances, unemployment and old-age benefits. (Chłoń-Domińczak et al., 2016; Edwards, 2003; Ferragina & Seeleib-Kaiser, 2011; Kohli & Albertini, 2006).

The second key dimension is the social stratification. This measurement examines the operation of each welfare regime based on social relations, structuring class and equality of status. Indicators measuring social stratification are the level of private spending in pension and healthcare as well as the continuum between corporatism and etatism, mean-tested and universalism (Ferragina & Seeleib-Kaiser, 2011).

According to the level of de-commodification and social stratification, Esping-Andersen (1990) has classified countries into three different welfare regime: liberal, conservative and social-democratic.

Firstly, liberal welfare regime is defined as low de-commodification and high social stratification. Individuals are rewarded through their work from the market, thus indicating high market dependency. State intervention occurs at minimal level giving only basic needs. Thus, social assistance is directed to only those who are in the most need such as the low-incomes or those who live in poverty. This implies that, in addition to low benefits, they are also mean-tested. Those who do not meet the mean-tested criteria purchase private insurance for themselves. Countries belonging to this group are mostly the Anglo-Saxon such as US, UK, Canada, Australia, New Zealand and Ireland.

Secondly, influenced by the Catholicism and absolutism, Corporatist welfare regime, also known as the conservative regime offers middle level of de-commodification and high social stratification. The middle de-commodification can be perceived from the sufficient state intervention with condition that the assistance can no longer be covered by the family. The main concept of conservative is to maintain hierarchy and the welfare provision is based on the subsidiarity principle. The welfare provision under this regime is not universal, thus encounter high social stratification in which the benefits given depending on profession. The entitlement is tied up to class and status. For example, some programs are only designed for civil servant which in turn create loyalty among state officers to government. This regime also supports a family as a primary source of help to provide some service as the social insurance is not completely inclusive. Countries belonging to this group are mostly the continental Europe such as Germany, France, Italy, Austria, Belgium and Switzerland.

Thirdly, Social democratic welfare regime is characterized as high de-commodification and low social stratification. The role of state is the strongest among other regime diminishing the market role in providing assistance. Low social stratification indicating that everyone is included in the system showing through universal of benefits and high benefit equality. Unlike liberal and conservative regime, the social rights in this regime are granted on a basis

of citizenship, not mean-tested or social status. Some public program such as social insurance is earning-related which also maintain the middle class into the public system with a possibility to extend their benefits or pensions by purchasing private insurance. Public consumption in this regime is high and incurring huge expenses. Out of necessity, full employment is of great importance to ensure enough tax revenue to finance the expenditure. Hence, the role of state in this regime is significant in two folds: providing social services and income protections. Countries belong to this regime are mostly Scandinavian such as Denmark, Norway and Sweden but also Netherland.

Esping-Andeson's typology of welfare regime is a conventional way of clustering welfare that encouraged more of comparative social policy study. That being said, the typology has been criticized and questioned about the criteria that neglect the Mediterranean countries. Leibfried (1993) and Ferrera (1996) have suggested that southern European countries have specific unique characteristics that are distinctive from the three regimes proposed earlier. Italy, Spain, Portugal and Greece should therefore be considered as southern regime.

Led by clientelism and patronage, the southern welfare regime has low level de-commodification. The state intervention is weak and patronage system maintains. Provision of social service is a mix between public and non-public sectors. Labor market is strongly gendered, and informal labor market is found to be significant (Clasen, 2003; Edwards, 2003; Martin, 2015). Families receive minimal transfer and much of the care burden is imposed to the family. Although some cash subsidy exists, it is distributed selectively favoring the political client group.

2.1.4 Familistic View

As oppose to critiques, in his later work (Esping-Andersen, 1999), a dimension of “de-familialization” has been included in the criteria to capture the level of familism. He has implemented a new terminology “familistic welfare state” to classify countries in which welfare provision is highly obligated to household. Similar to the concept of de-commodification, the de-familialization refers to the dependency on family. The indicator is measured by the intensity of family welfare provision by looking at female labor force participation, the co-residence rate between adult children and elderly parents and the public service directed to family welfare such as parental leave, child care and elderly care.

To better understand the interaction between state, market and family regarding intergenerational responsibility, Saraceno and Keck (2010) have analyzed the 3 conceptual frameworks to identify family reliance: familism by default, supported familism and de-familialization. It is important to note that both state and market, in principle, can intervene the family dependency degree. However, the state role has always received more interest as concerning its ability to replace family responsibility.

First, the *familism by default* (unsupported familism) refers to minimal coverage and the absence of formal care service or policy to support family care by state and thus, the family

cares are given by default. Obligation in taking care of the dependency age: the young and the old is highly familism. The care of family in this dimension can be driven implicitly by cultures or explicitly by law. Second, the *supported familism* occurs when family members are supported by the policies (e.g. parental leave) mainly through financial transfer in order to maintain the family's responsibility in giving cares. Third, the welfare is *de-familialization* when the individualization of social rights diminish (or even replace) the family responsibilities (Chłoń-Domińczak et al., 2016).

According to Saraceno and Keck (2010), the familism/de-familialization continuum needs to differentiate two set of obligations: childcare and elderly care. With regard to this thesis, the elderly care element will be emphasized. Unlike childcare, the entitlement to elderly is more individualized depending on their personal biography. The family obligation in taking care of elderly can be driven by familistic values as generally understood, but also by obliged kin enforced by law such that the children have a legal obligation to provide financial help to their parents in need. Austria, Germany, Italy and Spain apply the legal obligation of intergenerational transfer. That also means no social service will be provided if their family members can still support them (Albertini et al., 2007).

Saraceno and Keck (2010) have mapped countries on the continuum and conclude distinctive clusters as follows. First, the Scandinavian countries and France have high degree of de-familialization to both childcare and elderly care. Regarding the finding, de-familialization in Scandinavia is also explained by the civil law for example the care for elderly is regulated in the Swedish Social Services Act (Edebalk, 2010). In contrast, family obligation in Sweden is rather optional. The opposite is true for the southern countries such as Italy, Spain, Greece and Portugal which are characterized by familism by default for both childcare and elderly care. The other countries are defined in the mixed boundary for example the elderly care in Austria tend to be more de-familialization but familism by default for childcare. For Germany, high supported familism is found for childcare and to some extent to elderly care.

Although de-familialization shows a clear pattern in some countries, the authors do not conclude that degree of de-familialization should stand in contrast to provision of family care, especially in the elderly care. That is to say, family does not necessary withdraw help in the presence of formal care provision (Igel et al., 2009). This argument therefore suggests another relationship type between formal and informal care.

Table 1: A summary of welfare regime by attributions

Welfare Regime	Liberal	Conservative	Social Democratic	Southern
Aim of the system	Regulation of poverty; needs' satisfaction through the market	Social protection of male workers	Universal access to high level of benefits and services to all citizen	Dualistic cover of social risks (over-protection of core /regular workers and under-protection of vulnerable and atypical workers)
Norms of access	Means-test	Work	Citizenship	Work and citizenship (in principle)
Financing	Taxes (+) & contributions (-)	Contributions	Taxes	Contributions (+) and taxes (-)
Regulation	Central state	Unions	Decentralized state	Clientelist local state
Nexus of solidarity	Market	Family	State	Family
Level of de-commodification	Weak	Medium	High	Weak
Level of de-familialization	+	--	++	--
Level of social protection	Weak	High	High	Moderate

Source: Martin (2015)

2.1.5 Comprehensiveness of Public Long-term Care

According to Esping-Andersen (1993), level of public spending represent just one dimension of social policy, however, it does not convey information about redistribution. Thus, share of public LTC expenditure should not be the only element when considering the comprehensiveness of public service. In addition, scope of entitlement; who are eligible and breadth of coverage; what are the service should also be taken into account.

Although some scholars have initiated several choices for clustering welfare, many countries are not able to classify themselves to one single groups. With regards to LTC coverage ,Colombo et al. (2011) attempted to define the system by comprehensiveness through 3 frameworks: eligibility rules, basket of service and cost sharing. A summary of each country is shown in Table 2.

- Eligibility rules

The eligibility rule describes scope of entitlement whether the system is universal or means-tested. The universal program provides cares to entire population ensuring wide accessibility

of the services. On the other hand, in the means-tested program, the formal LTC is only entitled to those below the threshold prioritizing to individuals who are in the most need.

- Breadth of coverage (Basket of services)

Breadth of coverage refers to the range of services provided. Service in health and nursing care is medical related that needs to be given by professional health workers. Generally, this service is included in public LTC system. The next element is the domestic care which is an assistance regarding IADL. Broad services are found in the Nordic countries where LTC expenditure is highly generous. Including more LTC services into the basket also implies large share of LTC expenditure.

- Depth of coverage (Cost sharing)

The level of LTC cost sharing between public and private differs greatly across countries regardless of their universality level. For example, some part of LTC insurance in Germany is still paid by out-of-pocket. LTC in Switzerland also incurs cost that need to be privately funded.

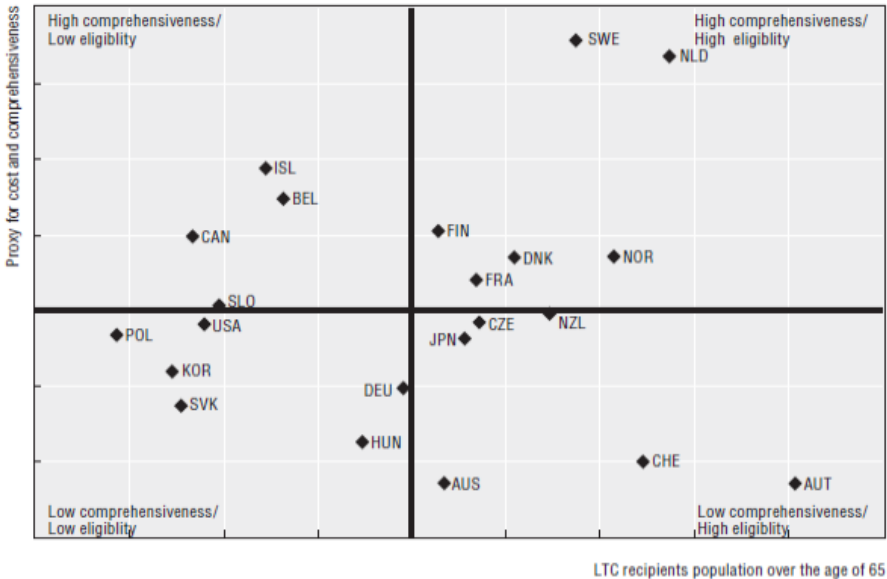
Table 2: Summary of LTC Coverage by country

Country	Eligibility to coverage	Coverage programs	Target	Types of benefits
Austria	Two cash benefit systems, one universal, one means-tested	Multiple programs: Income-related benefits	All, Income criteria	Cash, home and institutional care (in-kind benefits by Länders)
Denmark	Universal coverage within a single system	Universal, tax-based	All	Cash and in-kind, home and institutional care
France	Mixed system	Income-related benefits	All	Cash and in-kind, home and institutional care
Germany	Universal coverage within a single system	Public LTC insurance – Social insurance	All	Cash and in-kind, home and institutional care
Norway	Universal program within a single system	Universal, tax-based	All	Cash and in-kind, home and institutional care
Portugal	Mixed system		All	In-kind, institutional care
Spain	Mixed system	Mix of universal and means-tested	All	Cash and in-kind
Sweden	Universal program within a single system	Universal, mainly tax-based	All	Cash and in-kind, vouchers for care, Home and institutional care vary across municipality
Switzerland	Mixed system	Mix of universal and means-tested (or no) benefits	All	Cash and in-kind, institutional care, home care provided predominately by private organizations

Source: Colombo et al. (2011)

Having presented the framework of LTC comprehensiveness, Colombo et al. (2011) has visualized the welfare of each countries according to depth of coverage, breadth of services and system eligibility in figure 8. The horizontal axis represents system of eligibility of the system using the percentage of elderly age 65 and over who have received LTC. Thus, higher number of LTC recipients indicate high system eligibility (towards more universal). The vertical axis represents both the breadth and depth of coverage by using LTC spending as a share of GDP. The LTC expenditure is directly related to the public-private cost sharing category. Moreover, higher LTC spending also implies more services including in the basket.

Figure 8: *Comprehensiveness of LTC coverage, 2008*



Source: OECD Health Data 2010 cited in Colombo et al. (2011)

2.2 Previous Research

State and family form a complex interrelation that requires a multidisciplinary perspective (Pfau-Effinger, 2005). Due to this complicity, the association between public care provision and informal care found inconsistent results from previous literatures.

On one stand, the implication from de-familialization concept has led us to conclude that the occurrence of welfare state would replace family help. This is known as the “*crowding-out*” hypothesis. The second stand of literatures found evidence for “*crowding-in*” hypothesis witnessing the co-existence of formal and informal care. Lastly, when care intensity is introduced to the analysis, crowding-out and crowding-in apply depending on intensity. This hypothesis is known as the “*specialization hypothesis*”.

It is also important to note that while several literatures focus on the different pattern of association, only few attempts to prove the causality. Among those, Holly et al. (2010) have pointed out that the decision to provide informal care in Europe is based on the supply of formal care. On the other hand, the elderly’s decision to use formal care in U.S. is based on the informal care they have received. This could be explained by different in cost of formal care between these two institutional settings. As the formal care in U.S. is more expensive than those in Europe, the cost-concerned elderly then utilizes the informal care as the first source of help and purchase extra care if necessary. This argument is supported by *hierarchical compensation* in which care are given by the proximity of relationship and availability such as the first source of cares are spouses followed by children, relatives and formal care (Litwin & Attias-Donfut, 2009).

Given the different direction of relationship, studies employing U.S. sample often use the informal caregiving as explanatory variables (Kemper, 1992; Lo Sasso & Johnson, 2002; Van Houtven & Norton, 2004).

2.2.1 Substitution/ Crowding-out hypothesis

The notion of de-familialization seems to be more valid when the onset of modern welfare state took place together with nuclear family (Albertini et al., 2007; Kohli & Albertini, 2006). In this substitution hypothesis, state provides sufficient income and support to elderly discouraging additional intergenerational assistance (Igel et al., 2009; Wolfe, 1989). For example, an existence of pension by the state influence children to provide less or none financial transfer to their elderly parents. Similarly, the family care is substituted by state care. It is also known as crowding-out effect (Kohli, 1999). Some authors argue further that the comprehensive formal program not only reduces family help but also stimulate social isolation and hamper civil engagement (Fukuyama, 2000; Van Oorschot & Arts, 2005; Wolfe, 1989). From this hypothesis, we would expect minor help from family in countries with strong public provision. This also means that the family members are not facing a tradeoff and

employment withdrawal because the state takes responsibility in looking after of their elderly. On the other hand, when public provision is limited or not available, family members are the main source of care.

An earlier work by Kemper (1992) found support for substitution effect in which the availability of informal caregivers influence the reliance of using formal care. Sharing residence signify that elderly receive informal home care from the family members. The likelihood of co-residence increases with care needs and decreases with the prevalence of public home care. On the other hand, elderly lacking family source has a higher probability of using care at the formal institutions. A conclusion drawn from this study is the negative association between informal care and formal care utilization such that prevalence of informal care reduces the formal care use and the absence of informal care encourage the formal care use.

One of the most cited substitution literatures is conducted by Van Houtven and Norton (2004). Considering U.S. sample, the authors seek to understand how the quantity of informal care measuring by number of hours impact elderly use of formal care measuring from following 5 services: home health care, nursing home care, hospital care, physician care and outpatient care. The results found that informal care strongly reduces the use of health care and nursing care.

Using same database, Lo Sasso and Johnson (2002) have explores similar issue whether the informal care can reduce the usage of nursing home. Their main results suggested that elderly who have regularly received ADL help from children are 60% less likely to enter nursing home, supporting the previous literatures. However, when help is defined in broader term which is a combination between ADL (personal care) and IADL (e.g. grocery shopping), there is no significant reduction in the probability of using nursing home. A firm conclusion that can be drawn from the empirical result is that informal ADL help substitute the use of formal care, however, the effect of IADL help is still inconclusive. The different results due to different definition of informal help signify a degree of care intensity that deserves further investigation.

Greene (1983) has examined the interaction between formal and informal care in both direction. He has conducted two regression models; the first model with formal care as an independent variable and the second model with informal care as an independent variable. The empirical results show negative relationship between formal and informal care for both model concluding a substitution effect. The second model is compatible to the expectation of crowding-out effect, however, the evidence from the first model suggested that those who do not have enough informal resources also depend greatly on formal care as it is the only available choice. This also confirmed the finding in Kemper (1992). Thus, the negative association also reflect how the public service response to the unmet need.

Pezzin et al. (1996) have also evaluated the substitution effect by approaching through living arrangement. This study captures how the public homecare provision influences the living arrangement. The result shows that public homecare provision allows an individual to live more independently which reduce the chance of co-residence with the informal caregivers. However, the author emphasized that the reduction of informal care appears to be modest.

From the literatures discussing above, it is still not clear whether the formal care replace the informal care completely or that the informal care reduces only to some certain extent. We can assume from the former argument that formal and informal care are functionally equivalent (Haberkern & Szydlik, 2010). On the other hand, the second argument points out that informal care still exist, although at a lesser extent (Li, 2005).

2.2.2 Complement/ Crowding-in hypothesis

Statistical figure from Colombo et al. (2011) have shown that despite the prevalence of formal care, informal care can still be observed even in country with comprehensive public provision. The prevalence of both formal and informal care raises doubt about crowd-out hypothesis. Providing that the findings in substitution hypothesis are not consistent, another stand of studies support a co-occurrence of care from both formal and informal sectors.

Recall that informal caregivers are facing time allocation challenge between providing care and holding job. With the crowding-in hypothesis, the generous public service creates favorable conditions for family such as stress relief, reducing care burden, relax the tradeoff between care and employment. As a result, state supports encourage family to provide more informal support on a voluntary basis. In this hypothesis, the formal and informal care are complement (Holly et al., 2010). From the crowding-out hypothesis, the care responsibility is assumed to be taken solely by the state. From the crowding-in perspective, family is still necessary for some certain type of care provision.

Li (2005) investigated the response of informal caregivers in providing care when the public homecare is being received by disabled elderly. Results show a decreasing amount of informal care at the beginning when formal homecare was received but then remain stable thereafter. However, the initial decline is rather attributed to improvement in ADL and IADL disability and living arrangement change from co-residential to living separately. Overtime, informal caregivers do not withdraw their help when public home care become accessible. Interestingly, the study mentioned that the partnership between formal and informal care are beneficial to severely disabled elderly and those at more advanced age do not show substantial decline of receiving informal care. This fact indirectly suggests that co-occurrence of both types of care is also a reaction to high needs.

Künemund and Rein (1999) found no evidence to support the substitution hypothesis. The presence of informal care is assessed through countries with strong and weak welfare provision. Results show that, in a strong welfare state like Germany (relative to other countries), there is a greatest share of elderly receiving informal care. In weak welfare state countries like US and UK, the family care provision is low and high respectively. While the family support in UK is largely explained by financial transfer to supplement the weak pension system. In US, the main financial resources of elderly comprise of asset-based reallocation. From these findings, the authors conclude that state and family are

complementary in Germany and disprove the argument in which the state will diminish family role in giving care.

In addition, they found evidence to support the crowding-in hypothesis but lies within the inter-vivo transfer or reciprocal exchange of help. With old-age pension, elderly parents are equipped with financial resources and are able to transfer resources downward. In return, service given by elderly parents to their children increases the probability of receiving care from their children. Thus, family solidarity does not decline when the welfare system is strong.

Kohli (1999) also found evidences that disagree with substitution hypothesis. His findings state that the intergenerational transfer still exists despite the emergence of state role in elderly care. Similar to Künemund and Rein (1999), the downward intergenerational transfer from elderly parents to adult children is observed. Both (Kohli, 1999) and Künemund and Rein (1999) conclude the crowding-in effect by looking at the mechanism between downward financial transfer and upward time transfer.

The crowding-in hypothesis is one mechanism to support the co-occurrence of formal and informal care. However, the explanation should not be limited to only stress-relief argument. This raises a question of in what condition that the states need to encourage informal care to complement the formal care provision.

Common findings from previous literatures show that disabled elderly, seriously ADL-impaired individuals, parents with functional limitation, elderly with severe health condition, chronic illness requires more medical care and personal care more than anyone (Li, 2005; Litwin & Attias-Donfut, 2009; Penning, 2002; Greene, 1983; Igel et al., 2009). When studies focus on this particular group of elderly, the informal care are called upon to fill the high demand for care. Thus, in this case, the co-existence of both formal and informal is a response to elderly with high needs (Penning, 2002). In another case, it could also reflect the undersupply of formal care regardless of any welfare regime.

Another point to be discussed is the cost-effectiveness perspective which has been ignored in the crowding-in literatures. Recall from the background section, generous public care provision is financed through heavy tax and highly expensive. With the expansion of the share of elderly in the near future, the cost of LTC is therefore expected to increase. One possible way to put a break on increasing LTC expenditure is to involve family's responsibility.

Across OECD, 62% of LTC cost is attributed to institutional care suggesting that the institutional setting explain the highest portion. For cost-effectiveness reason, home-based and community service are encouraged to reduce LTC expenditure growth which also match with the users' wish to stay at home rather at the institutions. Policies to encourage home care are not prevalent only in countries with the most comprehensive welfare but at all level. For example, Sweden Canada, Ireland and Poland has implemented expansion of home-care supply. Finland and Czech control the institutional care admission. Australia, Sweden, Germany, Netherland and US employ cash benefit as an incentive to use home care (Colombo et al., 2011).

Anell et al. (2012) has explained further for the case of Sweden that budget constraint and demographic change propel the need for informal carers. The evidence shows that home-help services are less likely over the past two decades due to resource-maximizing by the municipality. However, the demand side is also play a role as the share of population aged 65 and over is increasing and some of this demand is unmet by the public care provision.

The crowding-in hypothesis perspective might sound contradict to what we have understood about typology of welfare and familistic view. However, the co-occurrence of both formal and informal care is possible due to stress-relief argument, distribution of responsibility between formal and informal sector, high care demand for disabled elderly and minimizing public expenditure.

2.2.3 Specialization hypothesis

The specialization hypothesis compromises the crowding-out and crowding-in effect of formal care to informal care. It assumes a division of labor between state and family, each party performs the care task that they are specialized in. In this case, the state involves with professional informal care provision that concentrate in medical care and other demanding tasks (Künemund & Rein, 1999). The demanding degree of each care task can be interpreted as intensity. The medical care and nursing care are therefore highly intensive, time-consuming, clinically demanding and required care from professional workers. On the other hand, the tasks performed by family such as help in IADL and emotional support much less-time consuming and sporadic, hence less intensive (Igel et al., 2009; Motel-Klingebiel et al., 2005).

Therefore, it implies that in countries with strong formal care provision, the possibility of giving informal care is higher but less intensive tasks. On the contrary, the countries with weak formal care provision, the likelihood of providing care is less, but the tasks are intensive. Literatures supporting this hypothesis are extensive. They assess the intensity by either time used or by the characteristic of task depending on data.

Motel-Klingebiel et al. (2005) analyzed the association pattern at comparative level by using typology of welfare regime as a framework. The research question is to test between crowding-out and crowding-in hypothesis by looking at the amount of formal services and family support in countries with different level of welfare generosity. Their empirical evidence show that family support is highest in country with generous welfare (Norway) and the lowest in country with family-orientated regimes (Spain). From the findings, the authors explain that the tradeoff between formal care and informal care is not the case for countries with well-developed welfare.

One of the most recent work by Verbakel (2017) has supported the specialization hypothesis. The author defines intense care work by using time intensity with a benchmark of 11 hours per week or above. For intensive care analysis, the results show that in countries with generous welfare provision, the likelihood of providing informal care is higher, but lower for

the likelihood of giving intensive care compare to countries with less generous welfare. In contrast, the intensive care provision is found to be strong in familistic countries.

Based on different source of data, Brandt (2013) have constructed studies with similar research question. The comparative analysis suggests that there exists help from children to parents and from parents to children in the Nordic countries, but the help is less time-consuming for both direction. This evidence therefore does not support the de-familialization argument. In contrast, few family supports are found in Southern Europe, but the care given at high intensive level. He then concluded that that public transfer and service crowd out intensive help but crowd in sporadic help from the family.

Similarly, Brandt et al. (2009) assess the intensity by task such that high intensive tasks are medical care and low intensive tasks are household help or help with authorities. In his study, elderly in Northern Europe where public provision is comprehensive, are more likely to receive spontaneous, non-demanding help by their children. Thus, the prevalence of family support in the strong welfare countries can be understood by the types of care provided. This study support the specialization hypothesis with similar explanation as in Brandt (2013). Igel et al. (2009) also differentiate intensity by care and help and conclude that the formal care crowd-in the sporadic help but crowd-out the intensive help.

Bolin et al. (2007) has designed the study by using informal care as an explanatory variable and found that informal care substitutes the formal home care but complement the doctors and hospital visits. North-south gradient also exist due to cultural context and partly due to availability of public service. In the southern Europe where familistic view is strong and public provision is weak, the negative association between informal and formal care has the highest magnitude comparing to central Europe and northern Europe.

The specialization adds to the existing debated between crowding-in and crowding-out by paying attention to the care intensity. LTC in fact consists of a wide range of services that vary greatly by the requirement of times and skills. Some previous literatures have found evidence that definition of care attributes to the contradicting results. Thus, differentiating types of care by intensity can provide a more thorough pictures.

2.3 Hypothesis

Following the specialization hypothesis, the chance of giving informal care and the chance that informal care is highly intensive are of interests. Two hypotheses can be formulated as follows:

H1: If the formal LTC expenditure is higher, the likelihood of providing informal LTC is higher but the likelihood of providing intensive care is lower.

H2: If the formal LTC recipients is higher, the likelihood of providing informal LTC is higher but the likelihood of providing intensive care is lower.

Following the arguments in the responsibility of care between state and family, two hypotheses can be formulated as follows:

H3: The likelihood of providing informal care and intensive care is higher for an individual who believes in care norms.

H4: The likelihood of providing informal care and intensive care is lower for an individual who believes in strong role of state.

3 Data

3.1 Source Material

Two levels of data are collected to answer research questions: micro level and macro level. The micro-level data is an individual data retrieved from the European Social Survey (ESS). Every two years, the ESS conducts a face-to-face interview based on attitudes, beliefs and behavior pattern across Europe. Throughout 2002-2016, 8 rounds of study have been published. Core module questionnaires such as socio-demographic questions are presented in all rounds. Rotating module represent specific theme of each round.

In this study, the individual level data is retrieved from ESS Round 7 (2014). The round 7 data provide rotating module on “Social Inequalities in Health” presenting social determinant on health outcome which allow an extraction of informal care provision.

Unlike the formal LTC, the data source of informal LTC provision is less abundant as it is less explicit. Data from national health survey may not be perfectly comparable across countries due to different definitions and questions designed to assess informal LTC. At the European level, the Survey of Health, Ageing and Retirement in Europe (SHARE) is commonly used to analyze formal-informal LTC relationship. Despite its merit in the consistency of definition and rich information regarding health and ageing, the SHARE data only include individuals age 50 and older (Börsch-Supan et al., 2013). Thus, the SHARE data ignore age group below 50 years old. On contrary, the ESS data contain individuals from age 15 to 102. The extension of age group allows a wider investigation for age group below 50 that could possibly be the informal LTC providers.

While the private intergenerational transfer is mostly financial, the informal LTC provision can be considered as a transfer of time giving to frail elderly. The comprehensive Time Use Survey such as Harmonized time use data (HETUS) and Multinational Time Use Study (MTUS) measure amount of time spent by individual on several activities such as paid work, housework and leisure. However, despite their extensive data, the category of “adult care” activity is not classified separately. In fact, it is combined in the general housework category (Vargha et al., 2016). Therefore, the true proportion of time spent on taking care of elderly is ambiguous.

In contrast, the ESS overcome this burden by specify questions directly to amount of time spent looking after family members due to long-term health issue and old-age health problem. These specific questions are crucial to the study as the informal LTC provision can be identified more precisely.

After excluding missing values, the total observation retrieving from ESS Round 7 is 14,916. This sample consists of those who reported themselves as care providers and non-care providers. Thus, this sample group will be used in the analysis of the likelihood of providing informal LTC. In addition, those who reported as care providers will be investigated further for their care intensity. Therefore, the total observation of intensity analysis is reduced to 5,131.

The macro-level data are country-profile data obtaining from Organization for Economic Co-operation and Development (OECD) Statistics. The OECD statistics collects same set of data in several different themes over long period of time from 1970-2017. Data from year 2014 are collected to complement the ESS Round 7 (2014). As mentioned earlier, the comprehensiveness of public LTC coverage is multidimensional. Following the discussion in Colombo et al. (2011), the total LTC expenditure financing by government schemes and compulsory schemes for each country is selected as an indication of breadth and depth of coverage. The data regarding share of LTC recipients age 65 and over is selected to represent the system of eligibility (OECD, 2017). The consistent cross-national data from OECD Statistics accommodate the comparability. However, some countries also reported missing data for year 2014. To fill the missing values, the data are therefore taken from the nearest year or as an average. The variation in types of benefit also influence the report of recipients. In general, both cash and in-kind benefit are prevalent in countries of interest, however, the data from Austria only report the recipients for cash allowance because the in-kind benefit is defined as an individual responsibility (Colombo et al., 2011).

Finally, the combined data from ESS Round 7 and OECD Statistics bring about the construction of dependent and independent variables which will be discussed in detail in the coming section.

3.2 Variables

3.2.1 Dependent variables

The study aims to investigate the likelihood of providing informal LTC and the likelihood of providing high intensive LTC. Therefore, two dependent variables are constructed.

Informal caregivers

The first dependent variable has binary values of either being the informal caregivers or none-caregivers. The individuals are coded as informal caregivers if they answer “Yes” to the following question from ESS Round 7.

“Do you spend any time looking after or giving help to family members, friends, neighbors or others because of long-term physical or mental ill health, disability or problems related to old age? Do not count anything you do as part of your paid employment”

Those who answered “No” are classified as none-caregivers. The merit of this question is that the care related to long-term health and old-age related problem is directly reported. Furthermore, the question ensure that the care is informal by excluding any paid professional care job.

High Intensive caregivers

We see from the previous literature that intensity of care can be approached by amount of time or types of activity. Given the structure of the ESS questionnaires, this study will define the intensity as a variation of time provided which can be extracted from the following questions.

“In general, how many hours a week do you spend looking after or giving help to family members, friends, neighbors or others because of long-term physical or mental ill health, disability or problems related to old age?”

Similarly, the second dependent variable has binary values of either being high intensive caregivers or low intensive caregivers. Note that only those who report as being informal caregivers from the first question are classified further in this question. Thus, the none-caregivers are not included in this variable.

Following a standard definition by OECD report, the care is considered to be highly intense if individual spend at least 20 hours and above per week on caregiving. In this survey, those who chose following answers are classified as high intensive carers: 21-30 hours , 31-40 hours, 41-50 hours and more than 50 hours per week On the other hand, those who chose the following answers are classified as low-intensive caregivers: less than 1 hour and 1-10 hours per week.

Although the types of informal care are not discussed in detail, we can make a reasonable inference for the intensity of care from time as the intensive demanding tasks such as physical care or personal care require more time to perform than sporadic help such as practical household or help with paperwork (Brandt et al., 2009).

3.2.2 Independent variables

Micro level

The micro-level data can be perceived as a proxy for composition effects, in addition to national context effects. These data set are complement to the country-level data the need to be controlled in the model

Age

The age variable in ESS is continuous. In this study, the age is categorized into 9 groups which facilitate the group comparison analysis. It also allows an observation of non-linear effect of age on care. It is expected that individual at adult age tend to become informal care giver more than any other age group.

Gender

In general, women perform housework in higher house than men. The share of women age 50 and over who provide informal care for OECD average is 59.8%. Thus, it is expecting that the likelihood for women to provide both informal LTC and intensive LTC is higher than men.

Marital Status

Marital status is a categorical variable include 5 values: married, cohabiting, divorced, widowed and single. The married category refers to legally married. The cohabiting is coded if respondents are in legally registered union. The divorced category includes both divorced and separated. This variable reveals support opportunity from spouse care givers. Given the availability of spouse, those who are in marital union are more likely to be informal care providers (Motel-Klingebiel et al., 2005).

Education

The education level is another socio-economic factor measured as the highest level of education the respondent received. As the level of education is associated with wages, the education level is therefore a proxy of opportunity cost for the care providers. When intensive care is defined as time-intensity, the opportunity cost of high-educated individual in giving intensive care is higher. Thus, individual with higher education is less likely to provide intensive care (Barczyk & Kredler, 2018).

Employment

The employment status is taken from the question regarding main activities in the last 7 days. 7 categories are defined: full time, part time, unemployed, housework, retired, disabled and other. The paid work is further divided into full-time and part-time (less than 30 hours per week). The unemployment category includes both who are actively looking for a job and those who are not. Lastly, the community work and military service are combined into category of other. Informal care providers have strong employment-status characteristics. It is expecting that those who are performing housework have the highest likelihood to provide informal LTC.

Children at home

Children at home is a dummy variable where 1= living with children and 0= does not. The prevalent of children in the household refers to the familial opportunity structure from adult children in giving informal LTC.

Care norms

This variable is collected to assess the opinion in providing cares. Each respondent has to scale themselves as Like me, Somewhat like me and Not like me to the statement “It is important to help people and care for others well-being”. The care norms variable values the view of family/friends to provide care. The “like me” category is expected to be the most prevalent in countries with strong familistic view.

Strong role of state

In contrast to care norms, this variable assess opinion towards to role of government in taking responsibility. The statement representing this variable is “It is important that government is strong and ensures safety against all threats”. Individual reporting “Like me” to the abovementioned statement is expected to be the most prevalent in countries where formal LTC is highly comprehensive

Macro level

LTC expenditure

The LTC expenditure is a continuous variable measured as percentage of gross domestic product (GDP). It is a combination of LTC health and LTC Social financing by government and compulsory contribution scheme.

LTC recipients

The LTC recipients is a continuous variable measure as a of a proportion of population age 65 and over receiving LTC.

The summary of the list of variables is presented in Table 3.

Table 3: Summary of variables

	Definition	Values
Dependent Variables	Informal caregiver	Dummy variable yes no
	Intensive caregiver	Dummy variable at least 21 hrs/week less than 21 hrs/week
Independent Variables	Age	Categorical variable 15-19 20-29 30-29 40-49 50-59 60-69 70-79 80-89 90+
	Gender	Dummy variable male female
	Marital Status	Categorical variable married cohabiting divorced widowed singled
	Education	Categorical variable lower than secondary secondary advance vocational tertiary
	Employment	Categorical variable full time part time unemployed housework retire disabled other
	Children at home	Dummy variable yes no
	Care norms	Categorical variable like me somewhat like me not like me
	Strong role of state	Categorical variable like me somewhat like me not like me
	LTC expenditure	Continuous variable
	LTC recipients	Continuous variable

4 Methods

4.1 Methodological approach

The main research questions determine 2 associations: 1. comprehensiveness of formal LTC and informal LTC provision and 2. Comprehensiveness of formal LTC and high intensive LTC provision. Accordingly, two set of regressions are estimated.

As presented in the variable section, the outcome of dependent variables is dichotomous: informal care giver/ non-caregiver, high intensive care giver/ low-intensive care giver, therefore binary logistic regression method is employed. This statistic model allows an investigation when dependent variable have two possible values (also known as multinomial logistic regression when the dependent variable is categorical.) and the independent variables can be dummy, categorical, continuous or combination (Asteriou & Hall, 2011).

The binary logistic regression estimates the probability of the outcome occurring. The model can be written as follows:

$$P_i = \Pr (Y_i = 1 \mid X_i = x_i) = \frac{\exp (\beta_0 + \beta_1 x_i)}{1 + \exp (\beta_0 + \beta_1 x_i)}$$

Y is the binary response in which

$Y_i = 1$ if the outcome occurs in the observation i

$Y_i = 0$ if the outcome does NOT occur in the observation i

$X = (X_1, X_2, \dots, X_k)$ is a set of independent variables

x_i = value of the independent variables for observation i

With the help of statistical software package, STATA, the binary logistic regression is calculated in which the result can be reported as either coefficient or odd ratios. The odd ratios are an exponential value of coefficient which can also be interpreted similarly.

Put mathematically,

Let β_j = coefficient of observation j, then

$$\text{Odd ratio} = \exp(\beta_j)$$

If $\beta_j > 0$, then $\exp(\beta_j) > 1$

If $\beta_j < 0$, then $\exp(\beta_j) < 1$

The odd ratio higher than 1 indicate an increasing odd that the outcome will occur. The opposite is true when the odd ratio is less than one.

Following the model equation above, two regressions for this thesis can be constructed accordingly

Regression 1: The likelihood of providing informal care

$$P_i = \Pr (\text{informal care giver} = 1 \mid X_i = x_i) = \frac{\exp (\beta_0 + \beta_1 x_i)}{1 + \exp (\beta_0 + \beta_1 x_i)}$$

Regression 2: The likelihood of providing high intensive care

$$P_i = \Pr (\text{intensive care giver} = 1 \mid X_i = x_i) = \frac{\exp (\beta_0 + \beta_1 x_i)}{1 + \exp (\beta_0 + \beta_1 x_i)}$$

Where X_i = age, gender, marital status, education, employment, children at home, care norms, strong role of state, LTC expenditure, LTC recipients.

To construct a well-defined model, both theoretical support and statistical support should be considered when selecting which variable to include. Providing a set of candidate independent variable, a stepwise manner is employed for the analysis. The principle of stepwise manner is to cautiously add or remove explanatory variable into the model based on the t-tests. Ideally, when no further variables can be reasonably justified, the final model is produced.

Thus, four models are constructed for each of the regression analysis. Since the hypotheses pay attention to comprehensiveness of formal LTC and attitude towards cares, therefore, LTC expenditure, LTC recipients, care norms and strong role of state are included in all model to track the change in odd ratios and p-values.

The first model regress only the LTC expenditures and LTC recipients on the dependent variables. The second model focuses on the opinions regarding care norms and strong role of state. Later, these four variables are presented in model 3. Model 4, the final model, controls

for the socio-demographic variables. The clarification of each model can be specified in detail as follows:

Regression A: The likelihood of providing informal care

Model 1a: $P_i = \Pr(\text{informal caregiver} = 1 \mid X_i = \text{LTC expenditure, LTC recipients})$

Model 2a: $P_i = \Pr(\text{informal caregiver} = 1 \mid X_i = \text{care norms, strong role of state})$

Model 3a: $P_i = \Pr(\text{informal caregiver} = 1 \mid X_i = \text{LTC expenditure, LTC recipients, care norms, strong role of state})$

Model 4a: $P_i = \Pr(\text{informal caregiver} = 1 \mid X_i = \text{LTC expenditure, LTC recipients, care norms, strong role of state, age, gender, education, employment, marital status, children at home})$

Regression B: The likelihood of providing high intensive care

Model 1b: $P_i = \Pr(\text{high intensive caregiver} = 1 \mid X_i = \text{LTC expenditure, LTC recipients})$

Model 2b: $P_i = \Pr(\text{high intensive caregiver} = 1 \mid X_i = \text{care norms, strong role of state})$

Model 3b: $P_i = \Pr(\text{high intensive caregiver} = 1 \mid X_i = \text{LTC expenditure, LTC recipients, care norms, strong role of state})$

Model 4b: $P_i = \Pr(\text{high intensive caregiver} = 1 \mid X_i = \text{LTC expenditure, LTC recipients, care norms, strong role of state, age, gender, education, employment, marital status, children at home})$

4.2 Limitation

The data collection faces challenge in finding data which are standardized or equally comparable. The data from OECD is taken from year 2014. However, not all countries provide data from 2014, thus the data for nearest year or average over the period is taken for some countries. It is also difficult to find variable that explain the values and norms about the role of state and family. At the aggregate level, the world values survey is conducted but the data is not available for all countries in this analysis. The paper takes the individual-level data from ESS to represent state-family role in providing care. However, there is no perfect question that directly ask about their opinions to the role of state and family to provide LTC. The equivalent questions were asked about their opinion to the role of state in general and the likelihood to provide care for other regardless of age. Thus, the interpretation for this variable needs to take this data construction into account. Another limitation is the difficulty in identifying whether the informal care is given to elderly parents or spouses as the recipients of care are not reported. However, age of caregivers gives some hints in which lower age caregivers are more likely to provide care to parents while it is unlikely for those who are at age 75 to provide care for their parents.

5 Empirical Analysis

5.1 Descriptive Statistic

Table 4: Individual-level data by informal care giver and intensive care giver. The numbers are presented in percentage (%).

		Informal caregiver N= 5,131 (34.40%)	None- caregiver N= 9,785 (65.50%)	High intensive caregiver N = 465 (9.06%)	Low intensive caregiver N= 4,666 (90.94%)
Age	15-19	5.34	5.87	2.58	5.62
	20-29	11.32	13.84	8.39	11.62
	30-29	12.88	16.23	13.12	12.86
	40-49	16.39	16.94	14.19	16.61
	50-59	22.59	14.83	25.16	22.33
	60-69	17.81	14.91	16.99	17.9
	70-79	10.17	11.63	12.26	9.97
	80-89	3.25	5.01	6.67	2.91
	90+	0.23	0.75	0.65	0.19
Gender	male	45.43	51.47	32.26	46.74
	female	54.57	48.53	67.74	53.26
Marital Status	married	53.05	48.04	59.57	52.4
	cohabiting	0.84	1.12	0.86	0.84
	divorced	11.64	10.27	11.4	11.66
	widowed	5.42	7.27	7.74	5.19
	singled	29.06	33.3	20.43	29.92
Education	lower than secondary	10.35	12.37	20.86	9.3
	secondary	50.59	52.41	50.54	50.6
	advance vocational	15.67	13.14	12.69	15.97
	tertiary	23.39	22.08	15.91	24.13
Employment	full time	43.05	44.56	26.88	44.66
	part time	7.5	6.5	5.16	7.74
	unemployed	6.1	5.46	8.39	5.87
	housework	7.29	5.38	24.09	5.62
	retire	23.58	25.2	26.88	23.25
	disabled	2.71	2.02	3.01	2.68

	other	9.76	10.88	5.59	10.18
Children at home	yes	34.92	33.37	44.95	33.93
	no	65.08	66.63	55.05	66.07
Care norms	like me	80.3	70.7	88.6	79.47
	somewhat like me	18.94	27.39	11.18	19.72
	not like me	0.76	1.91	0.22	0.81
Strong role of state	like me	60.01	61.64	68.17	59.19
	somewhat like me	31.81	31.27	25.59	32.43
	not like me	8.19	7.09	6.24	8.38

Source: European Social Survey 2014, Round 7

Table 5: Descriptive statistic for country variable

Welfare Regime	Observation	Informal caregivers (%)	High Intensive caregivers (%)	LTC expenditure	LTC recipients
Social Democratic					
Denmark	1369	44.05	3.32	2.52	15.5
Norway	1333	39.38	4.19	2.45	16.4
Sweden	1695	39.00	4.84	3.24	16.3
Conservative					
Austria	1684	21.14	14.61	1.21	24.0
France	1766	38.34	6.79	1.73	10.5
Germany	2864	33.97	7.81	1.22	13.0
Switzerland	1414	36.99	5.16	1.54	20.2
Southern					
Portugal	1141	31.03	22.03	0.54	2.0
Spain	1650	27.82	24.4	0.71	8.1
Mean		34.64	10.35	1.66	14.15
Standard deviation		7.00	8.03	0.82	5.72
Min		21.14	4.19	0.54	2.0
Max		44.05	24.4	3.24	24

Source: OECD Statistics 2014

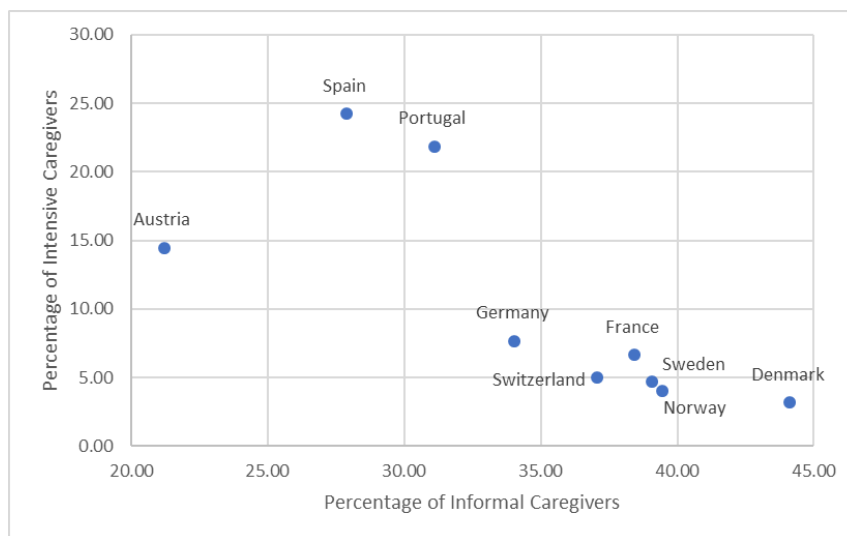
Note: LCT recipients for Denmark refers to 2012. LTC recipients for Austria represent recipients of cash allowance from year 2010. LTC expenditure measure as percentage share of GDP. LTC recipients include both institution and at home measuring as percentage share of population age 65 and over.

Table 6: Percentage of informal caregiver by country and employment status

Welfare Regime	Informal caregiver							Total (%)
	full time	part time	unemployed	housework	retired	disabled	other	
Social Democratic								
Denmark	49.59	5.97	4.31	1.82	24.05	2.32	11.94	100
Norway	51.24	7.24	2.48	4.38	18.48	5.52	10.67	100
Sweden	49.92	5.75	4.69	3.78	21.79	3.18	10.89	100
Conservative								
Austria	35.67	10.11	5.62	11.80	29.78	0.28	6.74	100
France	40.47	5.61	7.98	3.69	32.50	2.66	7.09	100
Germany	41.73	10.69	4.01	9.04	23.74	1.95	8.84	100
Switzerland	41.68	11.28	3.63	7.84	22.56	2.29	10.71	100
Southern								
Portugal	34.75	2.82	8.47	13.84	25.71	3.67	10.73	100
Spain	35.51	5.66	17.65	15.25	12.64	2.61	10.68	100

Source: European Social Survey 2014, Round 7

Figure 9: Scatter plot for informal caregivers and high intensive caregivers in percentage



Source: European Social Survey 2014, Round 7

5.1.1 Discussion of descriptive statistics

In the quantitative analysis, the descriptive statistics present data in a more meaningful way. Although, it does not allow us to draw a firm conclusion about the association, the descriptive statistics greatly contribute to the interpretation of empirical analysis.

Table 4 provides a tabulation of individual characteristic that allow a comparative look between informal caregivers and intensive caregivers. Informal caregivers are generally at age 50-59. They also represent the dominant age group for intensive caregivers. As this data set does not reveal to whom the cares are given to, the age category can give some hints to this ambiguity. As the majority of carers are at age 50-59 which are still considered as active age group, it is more likely that they provide care to the elderly parents.

The figure for gender is not surprising as women are more likely to be engaged in the household than men. However, the striking number takes place when looking at the proportion of women in giving informal care and high intensive care. Women comprise of 54.45% for informal care but 67.74% for high intensive care. These figures suggest that gender disparity is more prevalent in high intensive caregiving than informal caregiving.

Marital status does not show much variation. Generally, above 50% of informal caregivers and high intensive caregivers are married. Regarding education, there is a compositional change in which there are much less individual with tertiary education who provide high intensive care than informal care. This suggest that high-educated individuals have higher opportunity cost in giving care. Thus, when care is highly intensive, they are therefore less represented.

While the full-time worker shows the highest percentage share in informal caregivers, this category is represented much lower in the high intensive caregiver. On the other hand, those who are doing housework do not contribute much to the informal caregiver, but it has the highest portion in the high intensive care givers. These numbers seem to be compatible with the expected association between employment and care giving. As intensive care refers to time-intensive, it is therefore related to the availability of time that each employment category can supply.

Regarding attitudes to care norms, the data show that 80% informal carers believe in the importance of giving care to others while the figure is 88% for intensive carers. There are less informal carers who believe in strong role of government for about 60%. The figure for care norms and role of state do not show much variation. These two variables are not necessary stand in contrast to each other which mean that those who believe in giving care to others can also be those who believe in strong role of state.

Table 5 explain the caregiving at country level which are sorted by the typology of welfare regime. In social democratic regime, the number of informal caregivers is the highest among other regimes with 44.05% in Denmark, 39.38% in Norway and 39.00% in Sweden. On the other hand, the social democratic countries show the lowest share of high intensive caregivers of below 5%. Opposite pattern is true for countries from southern welfare regime. Portugal and Spain have low share of informal caregivers but much higher for high intensive

caregivers. Austria, despite being in conservative welfare regime, the share of informal caregivers is the lowest. Other countries in conservative welfare regime range in the middle for both informal caregivers and high intensive caregivers. This information leads to an assumption that there are more informal caregivers and less of high intensive caregivers in social democratic countries.

LTC expenditure and LTC recipients are also included in the table which are in compatible with the welfare regime category. Obviously, the highest LTC spending are found among social democratic countries and lowest in southern welfare regime. The LTC recipients however show more variation and the interpretation of this variable is expected to be less straightforward than LTC expenditure because it does not exactly follow the pattern in welfare regime. The highest share of LTC recipients are found in conservative countries like Austria and Switzerland. However, the LTC recipients in Austria receive cash benefits while Switzerland also show the highest share of privately funded LTC (figure 4). The negative association between the share of informal caregivers and high intensive caregivers can be observed from figure 9.

Table 6 aims to explain the argument regarding tradeoff between care and employment and the influence of social policy. First observation is that the majority of care provider for all country is working full time followed by retired. Second observation is the distribution of employment status has a country-characteristic pattern. In country with high level of LTC expenditure such as Denmark, Norway and Sweden, the about 50% of informal caregivers are full-time worker. On the other hand, the care provider that are unemployed or doing housework comprise just below 8%. In contrast, country with low LTC expenditure like Spain and Portugal, their full-time workers portion rank at the bottom two, 34.75% and 35.51% respectively. However, looking at housework category across country, we see that Spain has the highest percentage of caregivers who are doing housework. The same is true for unemployed category which is as high as 17.65%. For countries that range in the middle of LTC expenditure like Germany, Austria, France and Switzerland, their full-time portion also rank accordingly, except Austria that the figure is as comparable as Portugal and Spain. In the middle-range country, we can observe their distinctive number in part-time portion in which Austria, Germany and Switzerland are among the highest with the figure of 10.11%, 10.69% and 11.28% consecutively.

5.2 Regression Result

Table 7: Binary logistic estimates of informal caregiver

	Model 1a		Model 2a		Model 3a		Model 4a	
	OR	St. Err	OR	St. Err	OR	St. Err	OR	St. Err
LTC Expenditure	1.35***	0.03			1.37***	0.03	1.40***	0.03
LTC Recipients	0.98***	0.00			0.97***	0.00	0.97***	0.00
Care norms								
like me (ref.cat)			1.00		1.00		1.00	
somewhat like me			0.58***	0.02	0.57***	0.02	0.59***	0.02
not like me			0.33***	0.06	0.32***	0.06	0.34***	0.06
Strong state role								
like me (ref.cat)			1.00		1.00		1.00	
somewhat like me			1.15***	0.04	1.06	0.04	1.05	0.42
not like me			1.34***	0.09	1.17**	0.08	1.14*	0.08
Age								
15-19							0.63***	0.07
20-29							0.58***	0.04
30-29							0.51***	0.03
40-49							0.63***	0.03
50-59 (ref.cat)							1.00	
60-69							0.72***	0.05
70-79							0.53***	0.05
80-89							0.41***	0.05
90+							0.19***	0.06
Gender								
male (ref.cat)							1.00	
female							1.21***	0.04
Education								
lower than secondary (ref.cat)							1.00	
secondary							1.19***	0.08
advance vocational							1.40***	0.11
tertiary							1.24***	0.09
Employment								
full time (ref.cat)							1.00	
part time							1.14*	0.08
unemployed							1.31***	0.1
housework							1.54***	0.12
retire							1.23***	0.09
disabled							1.18	0.14
other							1.1	0.09
Marital status								
married (ref.cat)							1.00	
cohabiting							0.68**	0.13

divorced				0.96	0.05
widowed				0.79***	0.06
singled				0.90*	0.05
Children at home					
yes				0.99	0.04
no (ref.cat)				1.00	
Constant	0.44***	0.56***	0.49***	0.56***	
N	14,916	14,916	14,916	14,916	
Pseudo R2	0.009	0.01	0.02	0.04	

*p<0.1; **p<0.05; ***p<0.01

Table 8: Binary logistic estimates of high intensive caregiver

	Model 1b		Model 2b		Model 3b		Model 4b	
	OR	Std. Err	OR	Std. Err	OR	Std. Err	OR	Std. Err
LTC Expenditure	0.45***	0.04			0.47***	0.04	0.54***	0.04
LTC Recipients	0.98**	0.01			0.97***	0.01	0.98**	0.01
Care norms								
like me (ref.cat)			1.00		1.00		1.00	
somewhat like me			0.55***	0.09	0.55***	0.09	0.56***	0.09
not like me			0.25	0.26	0.26	0.26	0.29	0.29
Strong state role								
like me (ref.cat)			1.00		1.00		1.00	
somewhat like me			0.75**	0.09	0.85	0.10	0.91	0.11
not like me			0.72	0.15	0.92	0.19	1.11	0.24
Age								
15-19							0.56	0.22
20-29							0.92	0.22
30-29							0.89	0.16
40-49							0.78	0.14
50-59 (ref.cat)							1.00	
60-69							0.66**	0.13
70-79							0.79	0.19
80-89							1.55	0.47
90+							2.6	1.92
Gender								
male (ref.cat)							1.00	
female							1.36***	0.16
Education								
lower than secondary (ref.cat)							1.00	
secondary							0.83	0.13
advance vocational							0.75	0.15

tertiary				0.66**	0.12
Employment					
full time (ref.cat)				1.00	
part time				0.92	0.22
unemployed				1.67**	0.34
housework				4.53***	0.77
retire				2.10***	0.45
disabled				1.70*	0.52
other				1.13	0.31
Marital status					
married (ref.cat)				1.00	
cohabiting				1.09	0.61
divorced				1.08	0.18
widowed				0.88	0.19
singled				0.98	0.17
Children at home					
yes				1.56***	0.2
no (ref.cat)				1.00	
Constant	0.45***	0.12	0.52***	0.26***	
N	5,131	5,131	5,131	5,131	
Pseudo R²	0.06	0.01	0.07	0.13	

*p<0.1; **p<0.05; ***p<0.01

5.1.2 Report of regression result

Table 7 shows the binary logistic estimates of informal caregiver. The odds ratio is presented to demonstrate the effect of several dependent variables on the likelihood of an individual providing informal LTC. The number of observation is constant at 14,916 for all 4 models and the Pseudo R² also improve gradually.

From the basic model 1a, the odds ratio for LTC expenditure is shown 1.35. It can be interpreted as for one-unit increase in LTC expenditure, the odds of an individual providing informal LTC increases by 35%. The odds ratio for LTC recipient is 0.98 indicating that the odd of an individual providing informal care decreases by 2% for one unit increase in LTC recipients. Both independent variables are statistically significant at 0.01 level. Although LTC recipients represent another dimension of comprehensiveness, the result show that LTC recipients has a negative association to give informal care. However, the effect is not substantial.

Model 2b investigates the attitude in providing cares and the role of government to the likelihood of being informal care givers. As these variables are categorical, the interpretation is slightly different. For Care norms variable, “like me” is a reference category and the odd ratios are compared to this category. The odds of providing informal LTC for those whose attitude towards care norms are in the middle, the somewhat like me category, are 0.58 lower

than those who reported themselves as “like me”. The individual in “not like me” category has 0.33 lower odds for giving informal LTC than the like me category. Put differently, those who highly believe in care norm has the highest odds for being informal LTC providers. Both categories are also statistically significant at 0.01 level. From descriptive statistics, about 80% of informal caregivers are reported to strongly believe in given cares to others.

Similar interpretation is employed for the strong state role variable. In this case, individual who does not believe in strong role of government, the category “not like me” has the highest odd of becoming informal LTC provider with a value of 1.34 (34%) higher than those who believe in the role of state. All category for this variable is statistically significant at 0.01 level.

Model 3a is a combination of independent variables from 1a and 2a. The odds ratio for LTC expenditure, LTC recipients and care norms remain the same with slightly change in digit while their p-values are still statistically significant. However, for the strong state role, the somewhat like me category is no longer significant while the not like me category is now significant at 0.05 level.

Model 4a further controls for socio-demographic factors. In comparison to model 3a, the odds ratio for LTC expenditure and care norms slightly increase in magnitude. The odds giving informal LTC for a unit increase in LTC recipient is unchanged. Their p-values are statistically significant throughout 4 models suggesting that the effects are stable even when the composition effect is controlled. On the other hand, the strong state role decreases its odds ratio and significance throughout the model. It could be interpreted that attitudes towards role of state does not explain much for the likelihood of giving informal care.

Turning to the possible composition effect to the likelihood of giving informal LTC, individual age 50-59 has the highest odds followed by 60-69 and 40-49 which goes according to the descriptive statistics. All age category is statistically significant at 0.01 level. Gender disparity can be observed in which the odds in giving informal LTC is 1.21 times that of men (21% higher). As expected, those who are doing housework show the highest odds, 54% higher when compare to those who work full time. Considering education, individual with lower than secondary education has the lowest odds in providing care. Those with advanced vocational education has the highest odds of giving informal care followed by tertiary and secondary. As education also reflect earning ability, the fact that people at higher education show higher likelihood in giving care has an implication that care in this case is not intensive and they could easily allocate time for both work and care.

Regarding marital status, married individual has the highest odds followed by divorced and singled. . Finally, those who have children living at home have less odds in giving informal LTC, however, the effect is minimal, and number is not statistically significant. Thus, this variable might not be affect the decision in giving informal care.

Table 8 represents the binary logistics estimates of high intensive caregiver. The total number of observation is constant at 5,131 for all models. In the final model, the Pseudo R² improves strongly.

Model 1b only controls for the comprehensiveness of formal LTC. The odds ratio for LTC expenditure is 0.45 and statistically significant at 0.01 level. This indicates that for one unit

increase in LTC expenditure, the likelihood of providing intensive care decreases by 55%. The odds also decrease by 2% when the LTC recipients increase by one unit. In this model, LTC recipient is statistically significant at 0.05 level.

Next, the model 2b estimates the odds ratio given the attitude towards care responsibility. Starting from care norms, the like me is a reference category which also has the highest odd in giving high intensive care. The somewhat like me category has a significant p-value at 0.01 level and its odds is 0.55 lower and the odd is 0.25 lower for not like me category when comparing to like me. However, the latter category is not statistically significant. Those who believe in strong state role has the highest odds of providing high intensive care. Only somewhat like me category has a significant p-value. The somewhat like me and not like me have less likelihood than the like me category in giving intensive care.

Model 3b demonstrates the effect of each variables more precisely. In this model, LTC expenditure and LTC recipients remain statistically significant and their odds ratio are not much affected when more variables are controlled. The somewhat like me category is no longer significant in this model.

In the final model 4b, the odds ratio for LTC expenditure increases from 0.47 in model 3b to 0.54. This implies that, when socio-demographic variables are control, the odds for giving intensive care is 0.54 lower when the LTC expenditure increase by one unit. The effect of LTC recipient remains rather stable but with a lower significant level of 0.05. The care norm variable does not show any big change in the odds ratio and its significant level is the same throughout the model. The strong state role does not show any significant effect to the model.

Regarding age, all category is compared to 50-59. The result shows that age 80-89 has 1.55 higher odds of becoming intensive caregiver and the odd is even higher for 90+. However, there is no sign that the odds ratio is statistically significant. For the other category, they all have lower odds than 50-59. Only age 60-69 is significant in this model. The age variable may not give as clear pattern as what is shown in the informal care regression.

Gender is also confirmed to have disparity in giving high intensive care. The odds for women to provide high intensive care is 1.36 higher than men and it is also statistically significant. When care is defined as high intensive, women have even higher odds to giving care. This empirical result is compatible found in descriptive statistics.

For education, the lower than secondary has the highest odds. The odd for tertiary education is statistically significant at 0.66 lower than lower than secondary level in giving high intensive care. As expected from descriptive result, individuals with tertiary education has the least share in high intensive caregivers.

The employment shows a striking result for housework category. Individual who is doing housework has the odd of 4.53 higher than full-time workers in providing care. The retirees, disabled and unemployed also demonstrate higher odds ratio than full time. Marital status does not communicate much information regarding high intensive care as the odd ratios for each can be very similar. For example, the odds ratio for cohabiting is 1.09 while it is 1.08 for divorced. From this fact, it is not clear to draw a conclusion when two distinctive category has similar odds. In addition, none of the category is statistically significant. Lastly, having

children at home produces an odd of 1.56 higher in becoming high intensive carers than not having children.

6 Discussion

Demographic characteristics

Demographic characteristics of care giver also follow the traditional understanding and what have been found in the previous research. In this study, those who are likely to give informal care are individuals age 50-59, female who are having housework as a job. These characteristics are also found to be statistically significant as well. As mentioned in the limitation part that it is not easy to differentiate care giving to parents or to spouse, this result has shed some light on the age group which lead to conclude that the care is given to elderly parents more than spouse in this study. Gender disparity has always existed when it comes to household unpaid work (Glendinning et al., 2009; Jacobs et al., 2017). In addition, those who are doing only housework have the highest tendency to provide care.

The findings regarding employment status signify tradeoff between care and work such that those who are doing housework, unemployed and retired reported higher likelihood to provide care than the full-time individuals. The household category is reported to have the most likelihood in giving care and the countries that have the highest portion of caregiver who are doing housework are Spain and Portugal. On the other hand, the Nordic countries have the highest portion of caregivers who work full-time. This suggests that some policy in the Nordic countries create a favorable condition that do not force the individuals to leave the market force to provide care, the argument that is in line with crowding-in hypothesis.

Regarding norms and attitude, those who believe in the importance of giving care to others have the highest likelihood of giving both informal care and intensive care. This proxy is set to assess the familistic values at individual level which is believed to be more accurate than the aggregate level. While those who do not believe in strong role of state in providing protection and security have the highest likelihood in giving informal care, the effect is inconsistent in the high intensive caregiving. Also, it is important to note about this proxy that the survey questions do not ask explicitly to whether the care is given to whom or whether there should be a strong role of state in elderly care. Thus, respondents interpret the questions according to their general understanding which explain why the strong role of state variable is found to be inconclusive.

Higher education seems to be associated with likelihood in giving informal care. However, when care defined as high intensive, the association has a reverse direction. The high intensive caregiving provides more reasonable pattern related to education. As high intensive care is time-consuming, the tradeoff therefore occurs. High education is also associated with high income, thus for the highly educated to give up employment incurs higher opportunity cost than any other education level.

Formal and informal care interaction

By increasing the benchmark of high intensive care to at least 21 hours per week, this study found similar result of country variation as in Verbakel (2017). From descriptive results, there exists a negative association between share of informal caregivers and high intensive caregivers by country. The high presence of informal caregivers in country with strong welfare regime also found evidence in Künemund and Rein (1999). In addition, the southern countries maintain the characteristic in which there exists minimal portion of informal carers, but the cares are highly intense when given. Thus, by using a stricter benchmark, the prevalence of share remains the same. This could accentuate the fact that cares given by family in the southern welfare regime are extremely intense.

The comprehensiveness of public welfare provision also conveys interesting story. First, the result from this study stated that the odds of giving informal care is 1.40 (40% higher) when LTC expenditure increase by 1 unit. Second, the odd ratios of giving informal care is 0.97 (3% lower) when LTC recipients increase by 1 unit. Both are statistically significant at 0.01 level. On the other hand, result from Verbakel (2017) show that the odds of giving informal care is 1.26 when the generosity of LTC (LTC beds, LTC workers, LTC expenditure, LTC recipient) increase by 1 unit. In this study, LTC expenditures and LTC recipients represent the comprehensiveness according to Colombo et al. (2011). By analyzing them separately, the result shows that LTC expenditure and LTC recipients have different effect to the likelihood of giving informal care.

Turning to high intensive care regression, the odds of giving high intensive care is 0.54 (45% lower) and 0.98 (2% lower) for one unit increase in LTC expenditure and LTC recipients respectively. On the other hand, the figure from Verbakel (2017) is 0.87 (13% lower) for one unit increase in generosity of LTC. The first observation is that the result from LTC expenditure confirm the same direction of effect in Verbakel, however the magnitude is much differed. Second observation, LTC recipients has a negative association to both the informal caregiving and high intensive caregiving. This implies that the wider coverage of the entitlement (more universal), the less likely that the family would provide care. While the LTC expenditure is more intuitive and straightforward such as all country with strong public provision has high public expenditure, LTC recipients can be just moderate. This has an implication from the descriptive table that Austria and Switzerland are the top two countries with highest share of LTC recipients despite that their LTC expenditures are much lower than those of social democratic countries. In addition, it could also be interpreted that LTC recipient crowd-out the informal care and high intensive care. Although the variable is statistically significant, the effect is rather modest which may not be economically significant. However, the types of benefits received by the elderly is a mixed of cash benefits and in-kinds which are specific to each country (except that elderly in Austria received cash allowance). If the types of benefit can be classified, it would be interesting to see how cash and in-kind affect the decision of giving informal care.

Prevalence of crowding-in and crowding-out in this thesis support the specialization hypothesis that also found in previous literatures when intensity of care is taken into account (Bolin et al., 2007; Brandt, 2013; Brandt et al., 2009; Verbakel, 2017). The results from informal caregiver regression seems to be contradicted to what we understand about de-familialization concept presenting earlier by Espring-Anderson; the prevalence of formal care does not reduce family care and familism values; individuals in countries with low LTC but also equipped with strong familistic view has less likelihood to provide care.

However, when intensity is taken into consideration in the second regression, the contradiction become clearer. Assessing care by time intensity, the high intensive care is reduced when public LTC provision is high. Thus, we can conclude a crowding-out effect for high intensive care. The finding from high intensive care regression is more intuitive to our understanding and expectation that the family care is not necessary when the formal care is available. On the other hand, familism by default found evidence in Spain and Portugal. Family remains the primary source of intensive care in Southern European countries not only because of their familistic view but also limited availability of formal care.

Literatures that found co-existence of both formal and informal care took evidences from the Nordic countries and normally attribute the findings to crowding-in effect. However, few studies touch upon an area of cost-effectiveness when in fact the cost of generous public care is highly expensive. While the crowding-in effect is true for some extent, the prevalence of informal care in the Nordic countries can be explain by cost reduction argument. Providing the fact that LTC expenditure has the highest growth and expect to increase together with the increasing share of elderly the states are facing budget constraint in supporting the dependency age group. Introducing informal caregivers is one possible solution to keep cost within the budget. For example, more of LTC is given at home rather than in the institution as it is relatively cheaper. It also implies that family is expected to provide some basic cares.

7 Conclusion

With the emergence of population ageing, the proportion of old-age is growing over time. The old-age consumption per capita is also increasing when reaching later age of life. Combining these two factors, the expenditure regarding elderly is expected to increase rapidly implying a higher fiscal burden in the near future. The interrelation between state and family in providing elderly care explain how the burden is being shared.

The debate about how the role of family in giving care influenced by state role is inconclusive. The rise of nuclear family together with advanced welfare state has raised concerns that the state will replace family. However, numbers of literature found that this is not always the case.

This study assesses the interaction between formal and informal long-term care given to elderly. Data obtaining from European Social Survey allow an identification of informal caregivers, none-caregivers, high intensive caregivers and low intensive caregivers. By extending benchmark of high intensive care to at least 21 hours per week, the country variation remains similar to what have been found in Verbakel (2017). Descriptive results show that the highest share of informal caregivers and lowest share of high intensive caregivers are found in social democratic countries, which also show highest LTC spending. On the other hand, the southern welfare regime, with lowest LTC expenditure have the lowest share of informal caregiver and highest share of high intensive caregivers.

In addition, this study approaches the level of formal care provision through the 2 factors of comprehensiveness: LTC expenditure and LTC recipients. The result shows that LTC expenditure is more consistent to the framework of the typology of welfare, thus the interpretation for this variable is straightforward in which it crowd-in informal caregiving but crowd-out high intensive caregiving. On the other hand, LTC recipients crowd-out both informal caregiving and high intensive caregiver but the effect is rather small.

The results from this study suggest that family do not necessary withdraw their help given the availability of formal care, especially in country with high public expenditure. To some extent, the stress-relief and encouraging argument explain the co-occurrence of state and family help. However, the co-occurrence can also represent the response to high needs of severely disabled elderly. In addition, the co-occurrence of both care in country with high healthcare expenditure may imply another possible explanation that family help is needed to keep the cost within the budget.

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