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Netspar project: Optimal saving and insurance for old age: The role of public LTC insurance

Netspar International Pension Workshop
Leiden, the Netherlands
January, 19th 2018
Context and motivation

- **Public schemes** to help the elderly financing **long–term care** (LTC) services
  - Yet **large variations** in the organization of LTC policies (Muir, 2017)

- **Inequalities** and **equity** in the use of LTC services
  - How different groups consume different amounts or types of LTC services
  - Empirical literature growing but relatively scarce

- **Socioeconomic horizontal equity** in LTC use:
  - Whether individuals with similar “needs” for LTC have a similar utilization of LTC services, irrespective of their socioeconomic status
  - “Equal treatment for equal needs”

\[ \text{Equity in use} \neq \text{Equity in financing} \]
Research questions

- RQ:
  1. What is the degree of income–related inequalities in LTC use in the Netherlands?
  2. Is there some income–related horizontal inequity in LTC use?

- Why The Netherlands?
  1. Seen as a benchmark for LTC policies (Colombo and Mercier, 2012)
     - Public spending on LTC: 4% of GDP (Spain: 1%)
     - Perceived as very egalitarian (Mot, 2010)
  2. Rich administrative data on LTC
Existing literature and contributions

- Literature on the **determinants of LTC use**
  - Socio–economic gradient (Bonsang, 2009; Bakx et al., 2015)
  - Only 3 papers specifically investigating into **income–related inequality and horizontal inequity** in LTC use
    - García–Gómez et al. (2015): Spain, survey data
    - Rodrigues et al. (2017); Carrièri et al. (2017): SHARE

→ **Strengths** of our analysis:

1. Both **home care** and **institutional care**
2. **Intensive** and **extensive margins** of LTC use
3. High **statistical precision**

- One study on **practice variation** in LTC in NL: Duell et al. (2017)
  - **Eligibility** rather than actual use
Outline

1. The LTC system in the Netherlands
2. Empirical approach
3. Data
4. Results
5. Concluding remarks
Outline

1. The LTC system in the Netherlands
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LTC insurance in the Netherlands

- **Public LTC insurance**
  - Needs assessment done by an agency, CIZ

- **Comprehensive**: nursing care, assistance with ADL, institutional care
  - 19% of the 65+ are eligible for LTC

- **Financial participation** of beneficiaries:
  - Resource–dependent copayments (mainly income)
  - Low by OECD standards *(Schut et al., 2013)*

- Yet substantial **policy changes** *(Maarse and Jeurissen, 2016)*
  - Reorganization of the schemes, increase in copayments

→ *Where did the system stand in 2012?*
Outline

1. The LTC system in the Netherlands
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Assessing horizontal inequality and inequity in LTC use

- Our **ranking variable**: equivalized household income
- Measuring **inequality**: concentration index (CI) of LTC use (Kakwani, 1997; Wagstaff et al.)
- **From inequality to inequity**: distinguish fair inequalities from unfair ones (Wagstaff and van Doorslaer, 2000)
  1. Establish the list of “need variables” → A *normative* dimension
  2. Estimate the **need–standardized use** of LTC = the use we would observe if differences in needs were neutralized
  3. Compute the **horizontal inequity** index, $HI$

\[
HI = CI(\text{standardized use}) = CI(\text{use}) - CI(\text{needs})
\]
Defining the norm of vertical equity in use

- To assess *horizontal* inequity in use, need a **norm of vertical equity in use**
  - How different the use of LTC by 2 individuals with different levels of needs should legitimately be

- **How to choose** a normal of vertical equity?
  - **Statistical derivation**: regress use on need variables; estimates give you a norm
    - *(Wagstaff and van Doorslaer, 2000)*
    - → “On average the system gets it right”
    - *(van de Poel et al., 2012)*

- **Originality** of the paper: rely on a readily available indication of the norm of vertical equity in the Netherlands
  - Eligibility decisions
Needs assessment in the Dutch public LTC insurance

- Needs assessment conducted by agency **CIZ**
- Disabled individuals (or relatives/health care providers) claim an assessment by filling out an (online) **application**
  - Health and functional status
  - Some background characteristics
  - The assessor can collect additional information
- Information on **income and wealth** not supposed to be collected by CIZ
- An **independent agency**
- Explicit **mandate for uniform treatment** across sub–populations and regions

⇒ One single **need variable** = CIZ–assessed needs
Outline

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Data

- Provided by CBS
- Exhaustive administrative registers of:
  1. Eligibility decisions made by the Dutch LTC agency
  2. Use of publicly-funded LTC
     (volume of in-kind LTC + take-up of cash benefits)
- Linked with socio-demographic information and tax registers
- Population of interest:
  - Focus on individuals 60+
  - Eligible for some “elderly LTC” in 2012

→ Final sample: N=616,934
Variables of interest

1. Measure of **LTC use**: monetary value of institutional stays, home care received and cash benefits used in 2012
   - Use **official tariff** of each type of care

2. Measure of **LTC needs**: monetary value of entitlements to public support granted by CIZ in 2012

3. **All other** available individual characteristics: **inequitable determinants** of LTC use
   - Age, gender and household composition
   - Origin, wealth, being a home owner
   - 2011 equivalized household taxable income
   - Dummies for the 32 LTC contracting regions
Descriptive statistics

**Figure 1:** LC use and eligibility: descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean/Share</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Eligibility</strong></td>
<td></td>
</tr>
<tr>
<td>Home care (<em>yes/no</em>)</td>
<td>65.0%</td>
</tr>
<tr>
<td>Institutional care (<em>yes/no</em>)</td>
<td>46.7%</td>
</tr>
<tr>
<td>LTC eligibility (<em>value</em>)</td>
<td>€31,061</td>
</tr>
<tr>
<td><strong>B. Use</strong></td>
<td></td>
</tr>
<tr>
<td>LTC use (<em>yes/no</em>)</td>
<td>91.8%</td>
</tr>
<tr>
<td>LTC use (<em>value</em>)</td>
<td>€22,820</td>
</tr>
<tr>
<td>N</td>
<td>616,934</td>
</tr>
</tbody>
</table>

- Distributions of the values of LTC use and needs: long upper tail
- LTC use/LTC entitlements = 64% on average
- Population with a majority of women, singles, in their 80s
- Income distribution is smooth
Outline

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Income–related inequalities in LTC use

**Figure 2:** Concentration curve of the annual value of LTC consumption

**Sample:** Individuals eligible for elderly LTC in 2012 (N=616,934).
Horizontal inequality and inequity

- Concentration of LTC use among the poor

  \[ CI = -0.0850^{***} \]

- The poor use more LTC services (in value) than the rich (Bakx et al., 2016)
Figure 3: Concentration curves of LTC use and needs

**Sample:** Individuals eligible for elderly LTC in 2012 (N=616,934).
Horizontal inequality and inequity

- Concentration of LTC use among the poor
  \[ CI = -0.0850^{***} \]

- Smaller concentration of LTC needs among the poor
  \[ CI^N = -0.0333^{***} \]

- Pro–poor horizontal inequity in LTC use
  \[ HI = -0.0517^{***} \]
**Differential use by income when controlling for needs (2)**

Figure 4: Need–standardized LTC use across income deciles

**Sample:** Individuals eligible for elderly LTC in 2012 (N=616,934).
Digging into potential factors of explanation

1. Decomposition of inequality (Wagstaff et al., 2003)
   - Linear regression of LTC use on needs and non-need factors
   - Contribution of a variable depends on its association with LTC use and how unequally it is distributed
   - High (non-causal) contribution of income itself

2. Looking at home care and institutional care separately
   - Similar patterns?
Subgroup analysis: home care versus institutional care

- **Home care** use and **institutional care** use may have different patterns in terms of inequality

→ Replicate the analysis on 2 subgroups:

1. Individuals eligible for home care (HC) in 2012
2. Individuals eligible for institutional care (IC) in 2012

<table>
<thead>
<tr>
<th>Table 1: Definition of LTC use and needs in the subgroup analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subgroup of individuals eligible for HC</strong></td>
</tr>
<tr>
<td><strong>LTC needs</strong></td>
</tr>
<tr>
<td><strong>LTC use</strong></td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>% of sample</td>
</tr>
</tbody>
</table>
Institutional care as an inferior good?

Figure 5: Probability of LTC use when eligible for institutional care

- CI and HI on subgroups:
Discussion

- The rich are more likely:
  - Not to use any care when eligible
  - To use home care or cash–benefits when eligible for institutional care

- Potential explanations
  - The Dutch LTC system is "overshooting" towards the poor in the provision of services
  - LTC use is price–elastic (Non, 2017; Roquebert and Tenand, 2017) & the rich face high copayments on institutional care
  - Different preferences and forward–looking behavior across the income distribution?
    - Substitution with informal care; anticipatory claim for eligibility
Robustness checks

1. Playing around the norm of vertical equity in use

2. Dealing with **individuals who die** in the year
   - 16% of our sample die within the year
   - Results robust to their exclusion

3. Alternative measures of **socio–economic status**
   - Differential use by wealth is less pronounced
   - *To do:* construct an indicator of spending power
Motivation & RQ
The LTC system in the Netherlands
Empirical approach
Data
Results
Concluding remarks

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Is there horizontal inequity in use in the Dutch LTC system?

- **Differential use by income** when controlling for needs is high
  → An **unexpected** feature of the Dutch LTC system

- Can we really talk about **pro–poor inequity**?
  - Differences in **preferences** → fair differences in LTC use?
  - Institutional care as an inferior good + **no–envy** principle
    → disadvantage for the poor
  - Are CIZ needs assessments “fair”?

- **Agenda** for upcoming research:
  1. Impact of copayments on living arrangements
  2. Take–up of personal budgets and use of private LTC services
  3. Do CIZ decisions depend on socio–economic factors when controlling for functional status and health?
Thanks for your attention

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### Figure 6: Sample descriptive statistics

<table>
<thead>
<tr>
<th>Entire sample</th>
<th>Mean/Share</th>
<th>s.d.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Eligibility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home care (yes/no)</td>
<td>65.0%</td>
<td>-</td>
</tr>
<tr>
<td>Institutional care (yes/no)</td>
<td>46.7%</td>
<td>-</td>
</tr>
<tr>
<td>Home care &amp; institutional care (yes/no)</td>
<td>11.9%</td>
<td>-</td>
</tr>
<tr>
<td>LTC eligibility (value)</td>
<td>€31,061</td>
<td>€29,871</td>
</tr>
<tr>
<td>Number of days of eligibility for care</td>
<td>255</td>
<td>132</td>
</tr>
<tr>
<td><strong>B. Use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTC use (yes/no)</td>
<td>91.8%</td>
<td>-</td>
</tr>
<tr>
<td>LTC use (value)</td>
<td>€22,820</td>
<td>€26,613</td>
</tr>
<tr>
<td>LTC use/LTC eligibility (ratio of values)</td>
<td>64.1%</td>
<td>70.2pp</td>
</tr>
<tr>
<td><strong>C. Demographic characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>67.0%</td>
<td>-</td>
</tr>
<tr>
<td>Age</td>
<td>81.1</td>
<td>8.8</td>
</tr>
<tr>
<td>Death in 2012</td>
<td>16.0%</td>
<td>-</td>
</tr>
<tr>
<td>With foreign background</td>
<td>12.0%</td>
<td>-</td>
</tr>
<tr>
<td>Lives with her spouse</td>
<td>34.5%</td>
<td>-</td>
</tr>
<tr>
<td><strong>D. Socio-economic status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equilized household income</td>
<td>€29,519</td>
<td>€24,187</td>
</tr>
<tr>
<td>Per capita wealth</td>
<td>€159,302</td>
<td>€537,157</td>
</tr>
<tr>
<td>Owns her house</td>
<td>32.2%</td>
<td>-</td>
</tr>
<tr>
<td>N</td>
<td>616,934</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: Values of eligibility, use and income are expressed in euros per year.
Horizontal inequality and inequity in LTC use

Table 2: Concentration and inequity indexes in LTC use

<table>
<thead>
<tr>
<th>CI</th>
<th>CI^N</th>
<th>CI^{NN}</th>
<th>Residual</th>
<th>HI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)=(1)-(2)</td>
</tr>
<tr>
<td>-0.0850***</td>
<td>-0.0333***</td>
<td>-0.0513</td>
<td>-0.0003</td>
<td>-0.0517***</td>
</tr>
<tr>
<td>(0.0008)</td>
<td>(0.0005)</td>
<td>(?)</td>
<td>(?)</td>
<td>(0.0005)</td>
</tr>
</tbody>
</table>

**Inference** on the indexes:

- Standard errors for $CI$, $CI^N$ and $HI$ were obtained using the **convenient regression** approach (Kakwani et al., 1997), applied to:
  - Actual LTC use, $y$
  - Need–predicted use, $\hat{y}^N$
  - Need-standardized use, $y - \hat{y}^N + \mu$

- Standard errors for $CI^{NN}$ and the residual can be obtained using **Bootstrap** resampling
Non-causal decomposition of potential inequity

- Contribution of a characteristic higher if **impact** on LTC use higher and **unequally distributed** across the income distribution

**Figure 7**: Decomposition of horizontal inequity in LTC use
Decomposition of inequity: formula

- $HI$ can be decomposed as (O’Donnell et al., 2012):

$$HI = CI^{NN} + \frac{2\text{cov}(\epsilon, R^I)}{\mu}$$

$$= \sum_{k=1}^{K} \left[ \left( \beta_k^{NN} \bar{z}^k \right) CI(z^k) \right] + \frac{2\text{cov}(\epsilon, R^I)}{\mu}$$

where:

- $CI^{NN}$ represents the contribution of the non–need determinants of care to the contribution index
- $R_i^I$ is the income rank of individual $i$
- $2\text{cov}(\epsilon, R^I)/\mu$ is the residual term
- $\mu$ is the population average LTC use
- $\beta_k^{NN}$ is the coefficient of non–need variable $k$ in the LTC use model
- $\beta_k^{NN} \bar{z}^k / \mu$ is the population average elasticity of $h$ with respect to non–need variable $z^k$

- A **non–causal** exploration of the variables associated with inequity
Model of LTC use and need–predicted use

- **Estimate a model of LTC use:**
  \[
  y_i = \beta_0 + \sum_{j=1}^{J} \beta_j^N x_j^i + \sum_{k=1}^{K} \beta_k^{NN} z_k^i + \epsilon_i \tag{1}
  \]
  - \(y_i\): annual LTC use for individual \(i\)
  - \(J\) need variables \(X\) and \(K\) non–need variables \(Z\)

- **Need–predicted LTC use, \(\hat{y}_i^N\), is computed as:**
  \[
  \hat{y}_i^N = \hat{\beta}_0 + \sum_{j=1}^{J} \hat{\beta}_j^N x_j^i + \sum_{k=1}^{K} \hat{\beta}_k^{NN} \bar{z}_k \tag{2}
  \]
  - \(\bar{z}_k\) is the population average of variable \(z^k\)

- **Need–standardized LTC use:**
  \[
  \hat{y}_i^{IS} = y_i - \hat{y}_i^N + \mu \tag{3}
  \]

- Compute the **concentration index** of \(\hat{y}_i^N\), \(CI^N\)
Figure 8: Concentration indexes of CIZ–needs and non–need variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>CI</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Need variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CIZ-assessed LTC needs (monetary value)</td>
<td>-0.0358</td>
<td>-</td>
</tr>
<tr>
<td><strong>Non-need variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (in 5 categories) [the richer are younger]</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Woman</td>
<td>-0.0727</td>
<td>-</td>
</tr>
<tr>
<td>Has a partner in the household</td>
<td>0.2963</td>
<td>+</td>
</tr>
<tr>
<td># of persons in the household</td>
<td>0.1307</td>
<td>+</td>
</tr>
<tr>
<td>Origin: Dutch</td>
<td>Ref.</td>
<td></td>
</tr>
<tr>
<td>Origin: Western country</td>
<td>0.0434</td>
<td>+</td>
</tr>
<tr>
<td>Origin: Turkey</td>
<td>-0.1407</td>
<td>-</td>
</tr>
<tr>
<td>Origin: Morocco</td>
<td>-0.0868</td>
<td>-</td>
</tr>
<tr>
<td>Origin: Suriname</td>
<td>-0.2603</td>
<td>-</td>
</tr>
<tr>
<td>Origin: Dutch Caribbean</td>
<td>-0.2706</td>
<td>-</td>
</tr>
<tr>
<td>Origin: other non-Western country</td>
<td>-0.2177</td>
<td>-</td>
</tr>
<tr>
<td>Dutch native</td>
<td>Ref.</td>
<td></td>
</tr>
<tr>
<td>Equivalized income (10 declines)</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Wealth per capita</td>
<td>0.4459</td>
<td>+</td>
</tr>
<tr>
<td>Home owner</td>
<td>0.3264</td>
<td>+</td>
</tr>
<tr>
<td>LTC contracting region</td>
<td>[]</td>
<td>x</td>
</tr>
</tbody>
</table>
Horizontal inequity in home care and institutional care use

Table 3: Inequality and inequity in LTC use: subgroup analysis

<table>
<thead>
<tr>
<th></th>
<th>CI</th>
<th>CI^N</th>
<th>HI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Subgroup eligible for HC</td>
<td>-0.0324***</td>
<td>+0.0127***</td>
<td>-0.0451***</td>
</tr>
<tr>
<td></td>
<td>(0.0008)</td>
<td>(0.0008)</td>
<td>(0.0012)</td>
</tr>
<tr>
<td>Subgroup eligible for IC</td>
<td>-0.0505***</td>
<td>-0.0235***</td>
<td>-0.0269***</td>
</tr>
<tr>
<td></td>
<td>(0.0008)</td>
<td>(0.0006)</td>
<td>(0.0004)</td>
</tr>
</tbody>
</table>

Notes: Standard errors for CI, CI^N and HI were obtained using the convenient regression approach (Kakwani et al., 1997).

- In both cases, evidence of **pro-poor horizontal inequity**
- For HC, pro–poor concentration of use reinforces the **pro–rich concentration of needs**
Robustness check: dealing with those who die in the year

- **Mortality** in our population of interest
  - 16% of the sample died before the end of 2012
  - Censoring of their annual LTC needs and use
- **Issue**: differential mortality along the income distribution

**What to do** with the deceased?
- Baseline treatment: *pro–rate LTC needs and use* based on the fraction of the year they were alive
- Results (entire sample) are **robust to the exclusion** of the deceased

**Table 4**: CI and HI: excluding the deceased (entire sample)

<table>
<thead>
<tr>
<th></th>
<th>Cl</th>
<th>$Cl^N$</th>
<th>HI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>-0.0850***</td>
<td>-0.0333***</td>
<td>-0.0517***</td>
</tr>
<tr>
<td>Excluding the dead</td>
<td>-0.0941***</td>
<td>-0.0443***</td>
<td>-0.0499***</td>
</tr>
</tbody>
</table>
Figure 9: Need–standardized LTC use by wealth decile
Is income a relevant indicator of socio-economic status?

- Is **current income** a relevant measure of socio-economic status for the elderly? (van Ourti, 2003; Rodrigues et al., 2017)

- Alternative: **wealth**
  - Measures the economic resources accumulated across the life cycle and available for LTC consumption
  - Assets and **bequest motive** for informal care

- Robustness check: use **per capita wealth** as ranking variable
  - Difference depends on the correlation between the individual ranks in the wealth and income distributions (0.44) (Wagstaff and Watanabe, 2003)

**Table 5: CI and HI: wealth versus income (entire sample)**

<table>
<thead>
<tr>
<th>Ranking var.</th>
<th>CI</th>
<th>CI^N</th>
<th>HI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>-0.0850***</td>
<td>-0.0333***</td>
<td>-0.0517***</td>
</tr>
<tr>
<td>Wealth</td>
<td>-0.0243***</td>
<td>-0.0109***</td>
<td>-0.0142***</td>
</tr>
</tbody>
</table>