A Multidimensional Approach to Children's Opportunities

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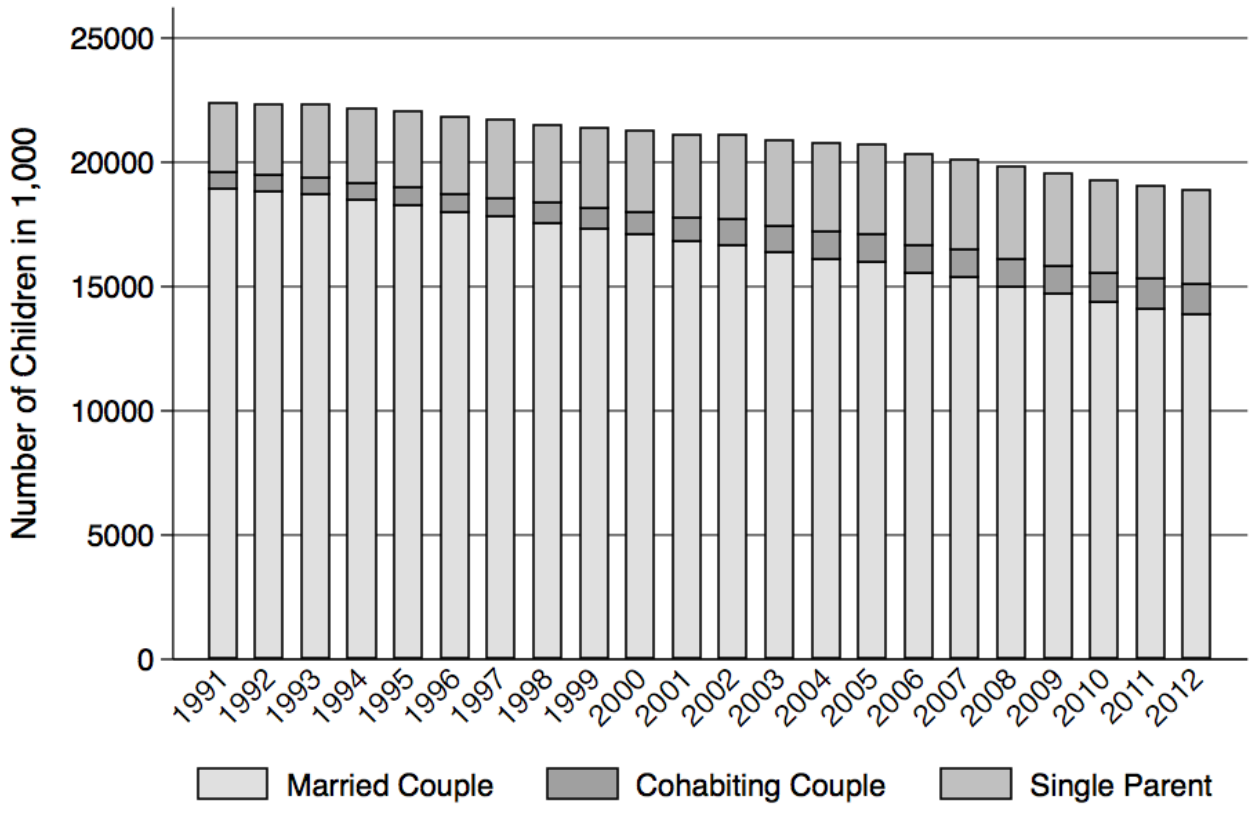
Increased variety in living arrangements



Sources: Microcensus 2012, own calculations.

Resources shaping children's capabilities

- Both **families' financial and non-financial resources** play an important role in shaping children's capabilities and their adult outcomes (see, e.g., Heckman, 2007).
- **Parents' educational background** determines their ability to transfer knowledge, to highlight the importance of education or to offer access to various cultural activities.
- **Parental childcare time** - regarding both quantity and quality - affects the development of children's cognitive and social-emotional skills (see, e.g., Jösch/Spiess, 2006).
- **Parents' educational background** in turn influences the quality of childcare time (see, e.g., Bianchi/Kendig, 2008).

Resources vary over family types

Single parent families

- have on average **lower net incomes** than married or cohabiting couple families
- hold **lower educational degrees**
- tend to spend **less time** with their children

But: expansion of publicly provided childcare and other in-kind benefits.

Multidimensional Poverty and Inequality

Shift from univariate measures of well-being (e.g. income inequality) to multidimensional measures

(see, e.g., Sen, 1985; Maasoumi, 1986, 1999; Tsui, 1995; Stiglitz et al., 2009)

Also reflected in policy initiatives such as **UN** Human Development Index, **OECD** Better Life Initiative.

Main advantage of a multidimensional approach is the ability to:

1. consider **different needs** of heterogeneous individuals, and
2. take account of **non-monetary resources** that are similarly important for the development of children's capabilities

Research Question

How did **multidimensional inequality and poverty** evolved over time in light of an **increased variety of living arrangements**?

Data | Sample

- Data set:
  - SOEP (v29)
  - Unbalanced panel design
- Sample:
  - Children aged 13 or below plus their respective parent(s)
- Sample Period:
  - 1991-2012

Data | Dimensions

(1) Parental income

- Yearly net equivalent family income
- Family incomes are equivalized according to the modified OECD equivalence scale

(2) Parental education

- Highest educational attainment of parents measured in years of schooling

(3) Parental childcare time

- Total hours spent on childcare activities by parents on an average week day
- Parents' caring time does not proportionately increase with the number of children
  - Equivalize parental time in the presence of siblings
  - using the square root equivalence scale (number of children$^{0.5}$).

(4) Non-parental childcare time

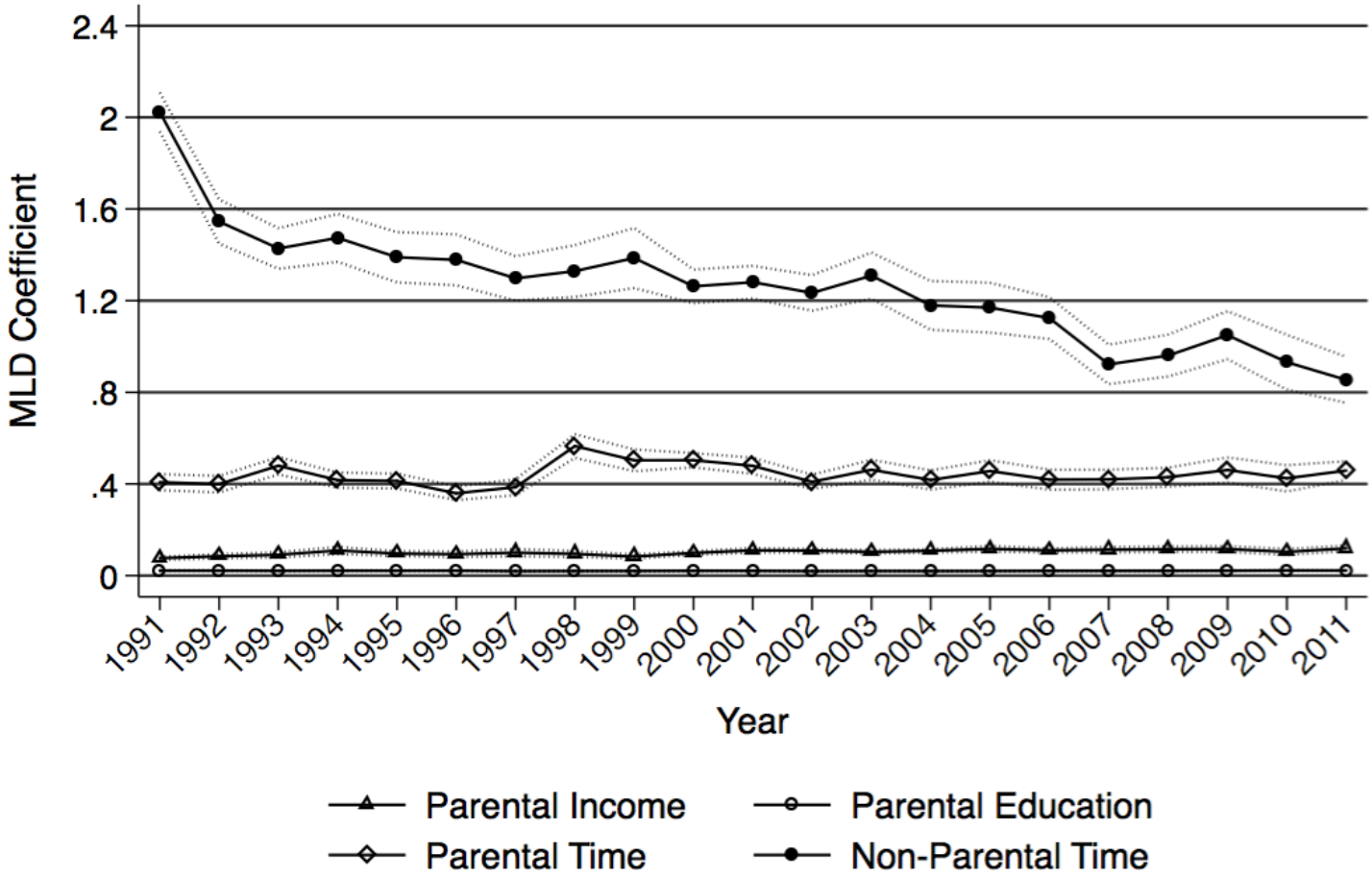
- Hours spent in school on an average week day
  - School type specific average hours according to statistics of the Standing Conference of the Ministers of Education and Cultural Affairs of the Laender
- Hours spent in kindergarten, crib (Krippe), after school care club (Hort) or with childminder on an average weekday
  - Half-day care: assumed to be equal to 4 hours
  - Full-day care: assumed to be equal to 8 hours

Standardization

- Standardize values of each dimension to values between 0 and 1
- We use the agreed goalpost approach (see Lugo, 2005)
- Observed values x_{itd} are standardized for every child i, $i = 1, ..., N$, and each dimension d, $d = 1, ..., D$, for all observation years t:

$$\tilde{x}_{itd} = \frac{x_{itd} - \min x_d}{\max x_d - \min x_d}$$

Univariate Inequality | MLD



Source: Own calculations, SOEPv29.

Multidimensional Poverty and Inequality

- Variety of multidimensional indices, axiomatic and 'ad-hoc' approaches
- We use Maasoumi's index (1986, 1999):
  1. Aggregate dimensions for each child using a utility-like function
  2. Aggregate individual functions using a poverty or General Entropy (GE) inequality measure
- Normative decisions have to be made on the
  1. weighting structure $w = (w_1, ..., w_d)$,
  2. degree of substitution between dimensions β and
  3. degree of inequality aversion α.

Maasoumi Index

Multidimensional Poverty and Inequality | First Step

- Aggregate across dimensions $d = (1, 2, ..., D)$ for every single child $i = (1, 2, ..., N)$
- using a utility-like function S_i:

$$S_i \propto \begin{cases} \left(\sum_{d=1}^{D} w_d x_{id}^{\beta} \right)^{1/\beta} & , \ \beta \neq 0 \\ \prod_{d}^{D} x_{id}^{w_d} & , \ \beta = 0 \end{cases}$$

$$\text{with} \quad \sum_{d=1}^{D} w_d = 1$$

w_d ...dimension weight
β ... rate of substitution between dimensions

Maasoumi Index

Inequality | Second Step

- Aggregate individual utility-like functions S_i using **GE measure**:

$$\text{For } \alpha = 0, \quad I_M = \frac{1}{N} \sum_{i=1}^{N} log \left[\frac{\bar{S}}{S_i} \right]$$

$$\text{For } \alpha = 1, \quad I_M = \frac{1}{N} \sum_{i=1}^{N} \left[\frac{S_i}{\bar{S}} \right] log \left[\frac{S_i}{\bar{S}} \right]$$

$$\text{with } \bar{S} = \frac{\sum_{i=1}^{N} S_i}{N}$$

α ... *degree of inequality aversion*

Maasoumi Index

Poverty | Second + Third Step

Define an **aggregate poverty line (APL)**, S_z:

$$S_z \propto \begin{cases} \left(\sum_{d=1}^{D} w_d z_d^{\beta} \right)^{1/\beta} & , \ \beta \neq 0 \\ \\ \prod_{d}^{D} z_d^{w_d} & , \ \beta = 0 \end{cases}$$

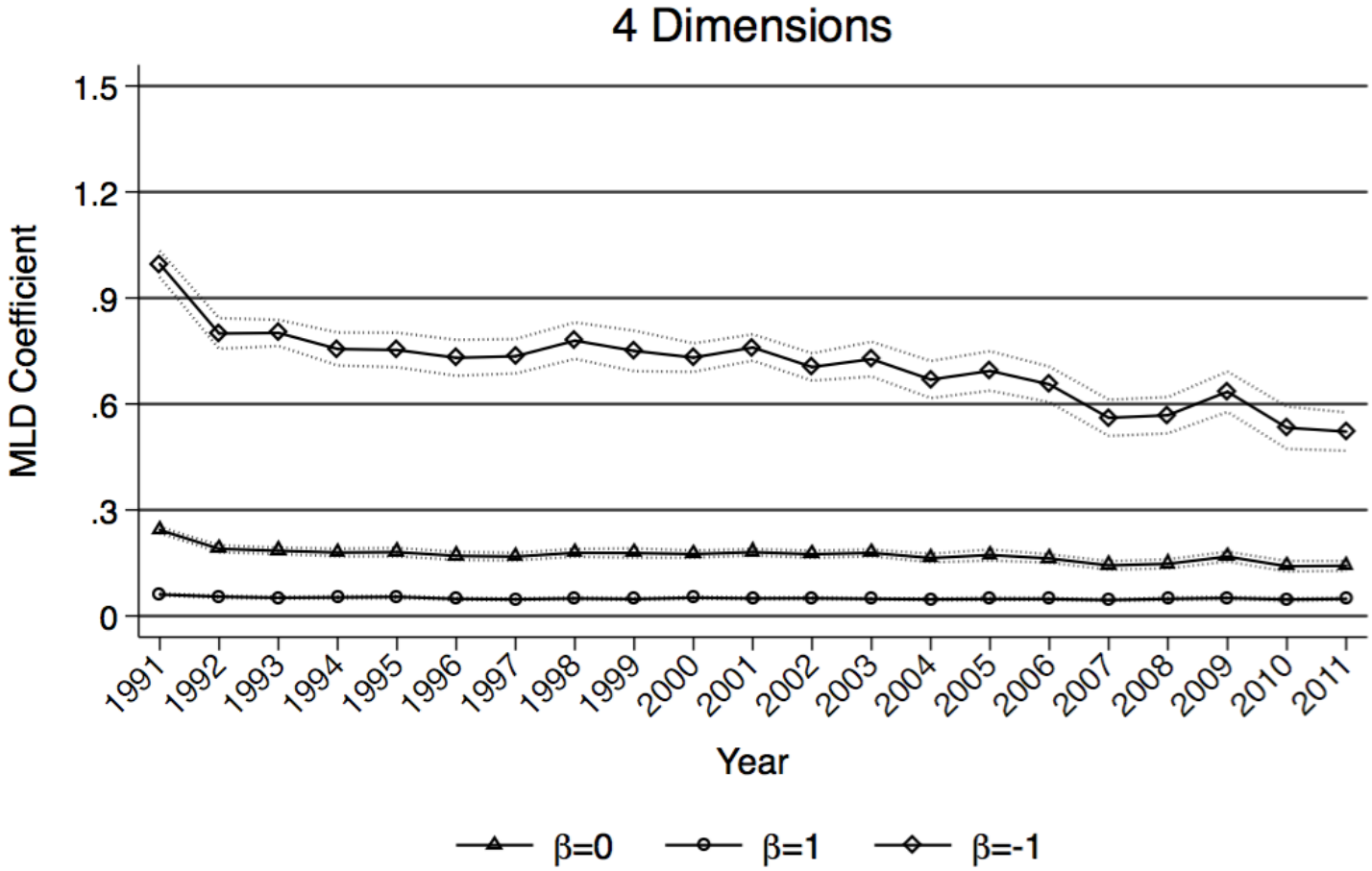
Aggregate utility-like functions S_i of deprived children using the α-*moment FGT poverty index*:

$$P(APL_{weak}) = \frac{1}{N} \sum_{i=1}^{N} \left[max \frac{S_z - S_i}{S_z}, 0 \right]^{\alpha}$$

w_d ...*dimension weight*

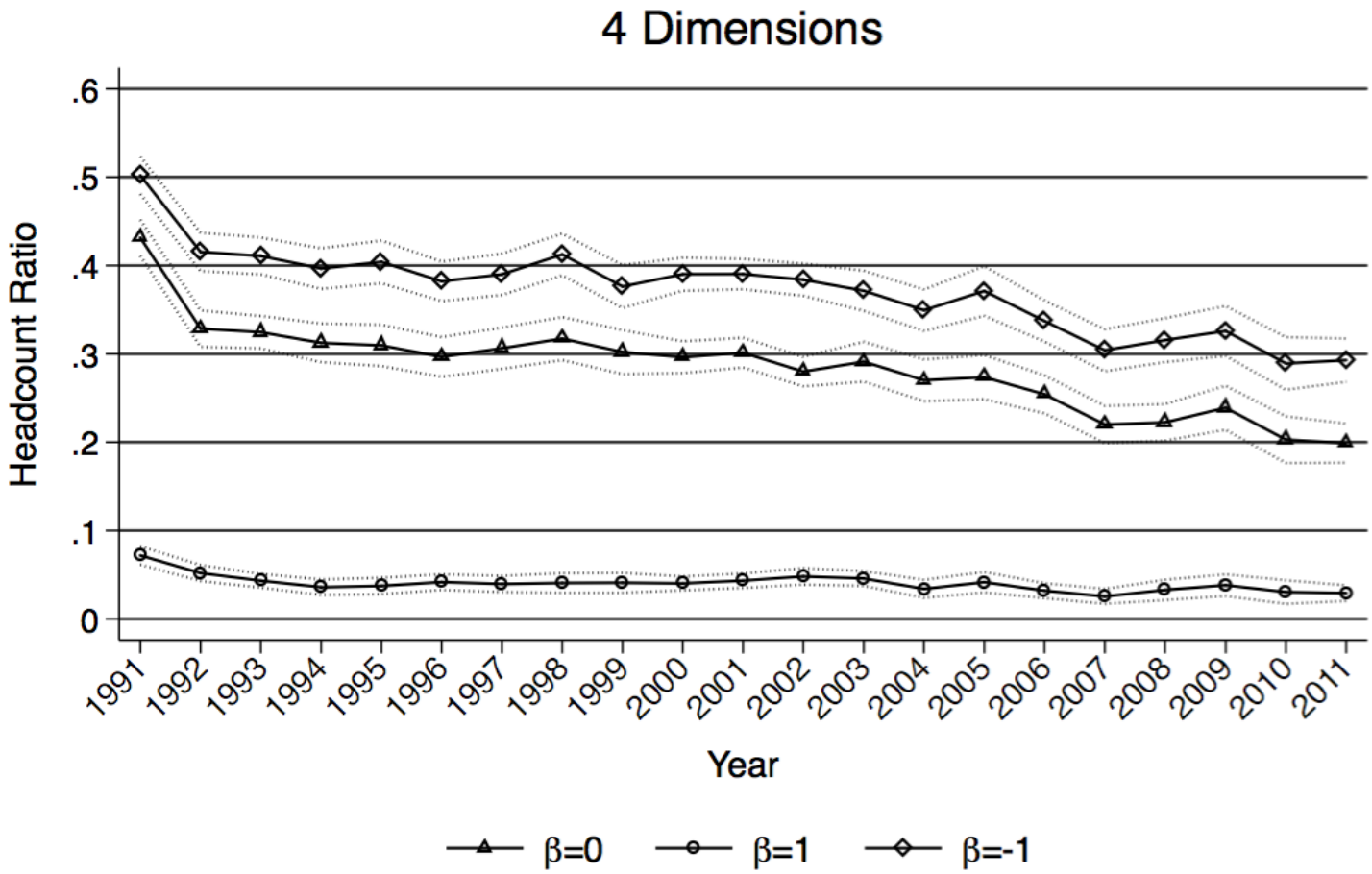
β ... *rate of substitution between dimensions*
z_d ... *poverty line of each dimension* (60% *of median*)

Multidimensional Inequality | MLD



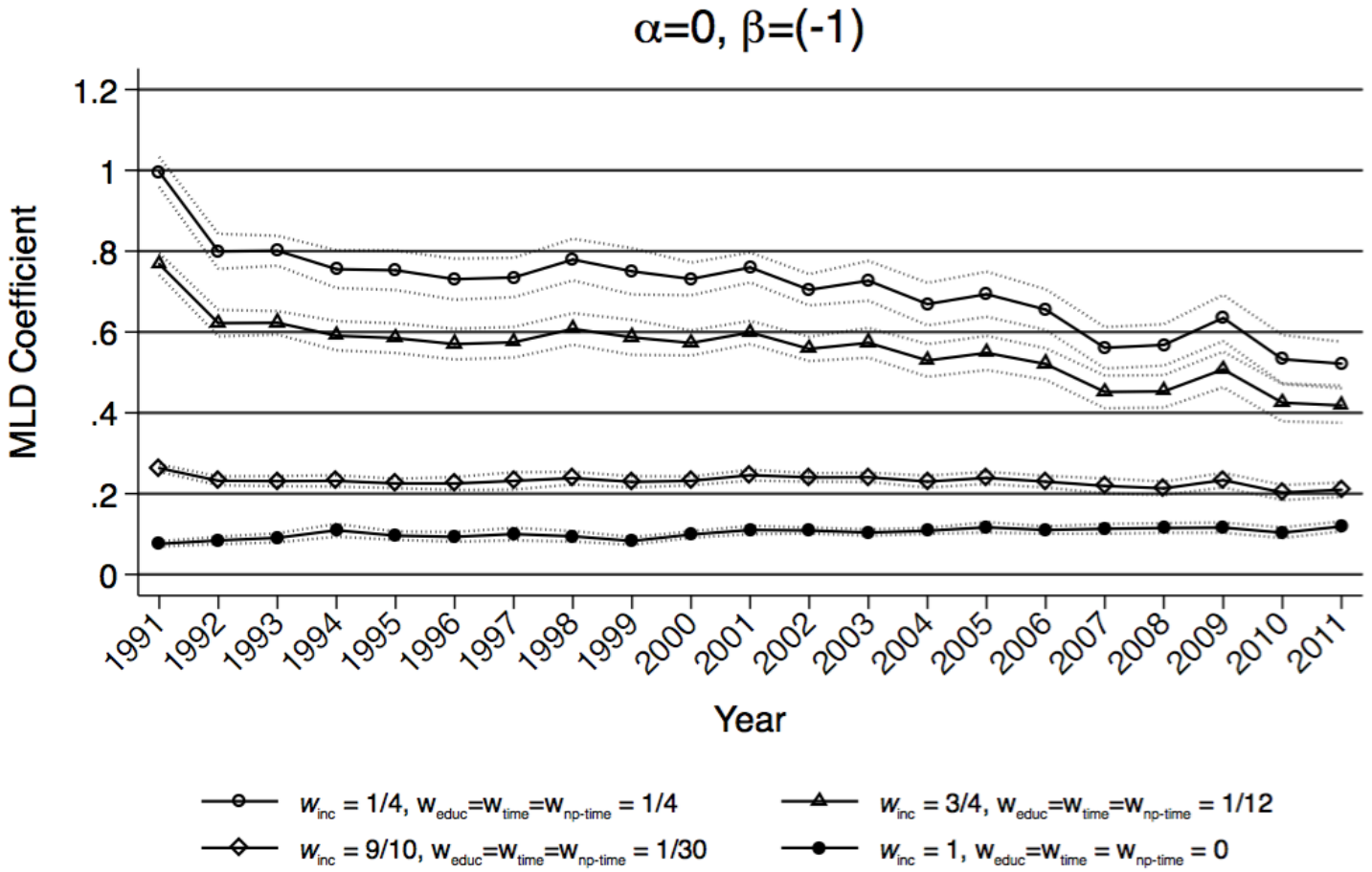
Source: Own calculations, SOEPv29.

Multidimensional Poverty | Headcount Ratio



Source: Own calculations, SOEPv29.

Multidimensional Inequality | Weighting Structure



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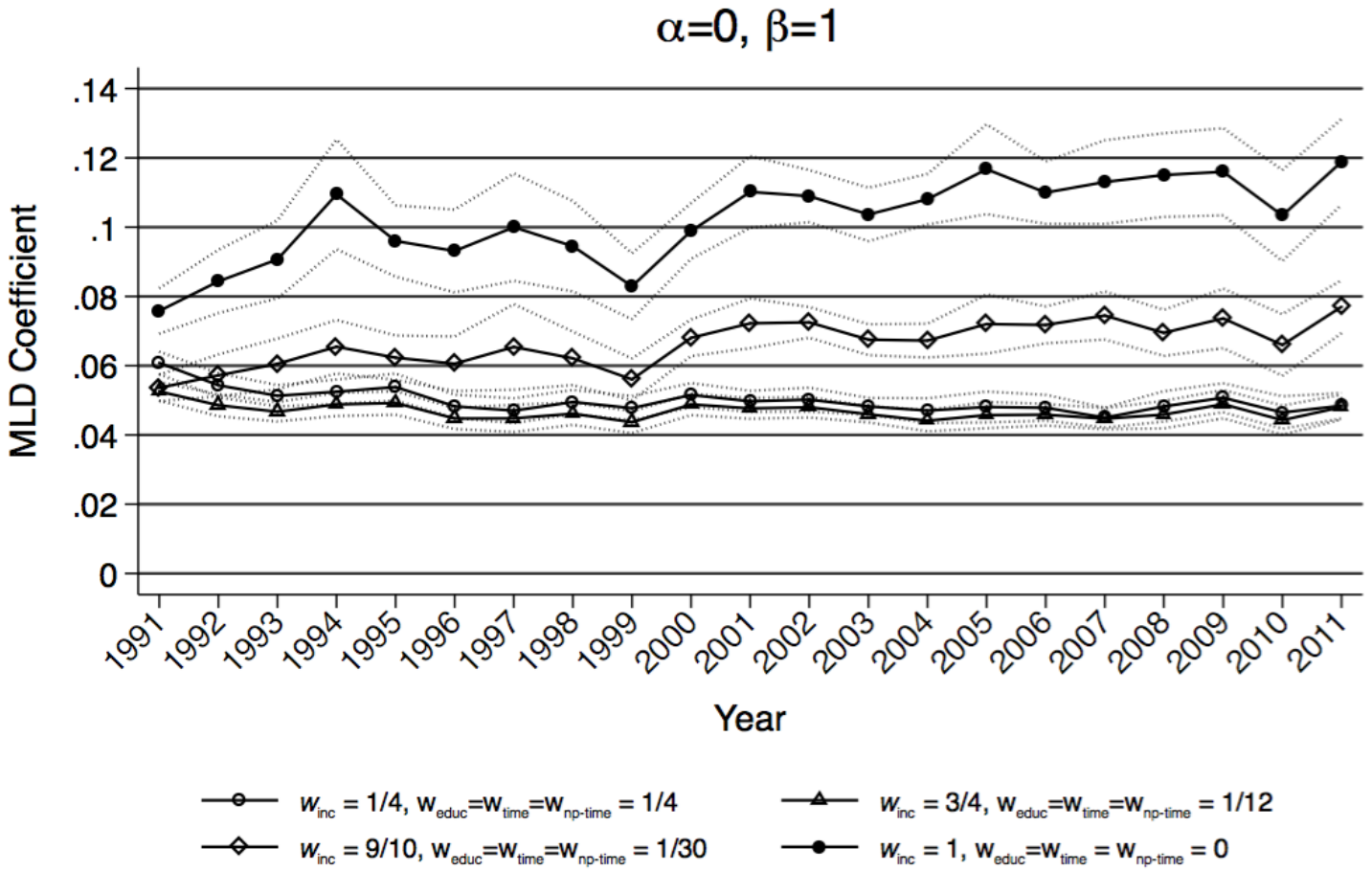
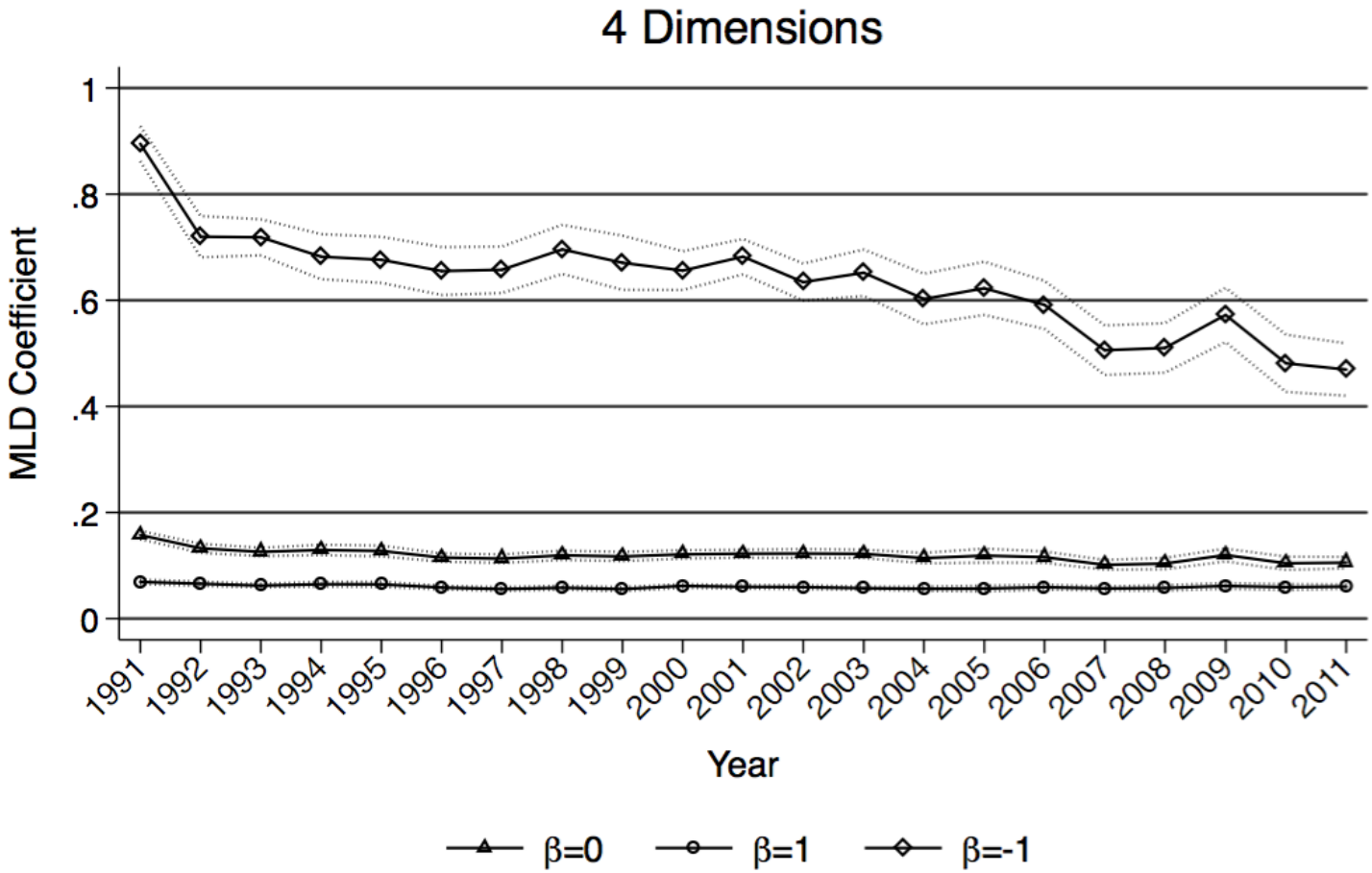
Multidimensional Inequality | Weighting Structure



Source: Own calculations, SOEPv29.

Multidimensional Inequality | Frequency Based Weights

$w_{inc} = 0.28, w_{educ} = 0.38, w_{p-time} = 0.16, w_{n-p-time} = 0.18$



Source: Own calculations, SOEPv29.

Concluding Remarks

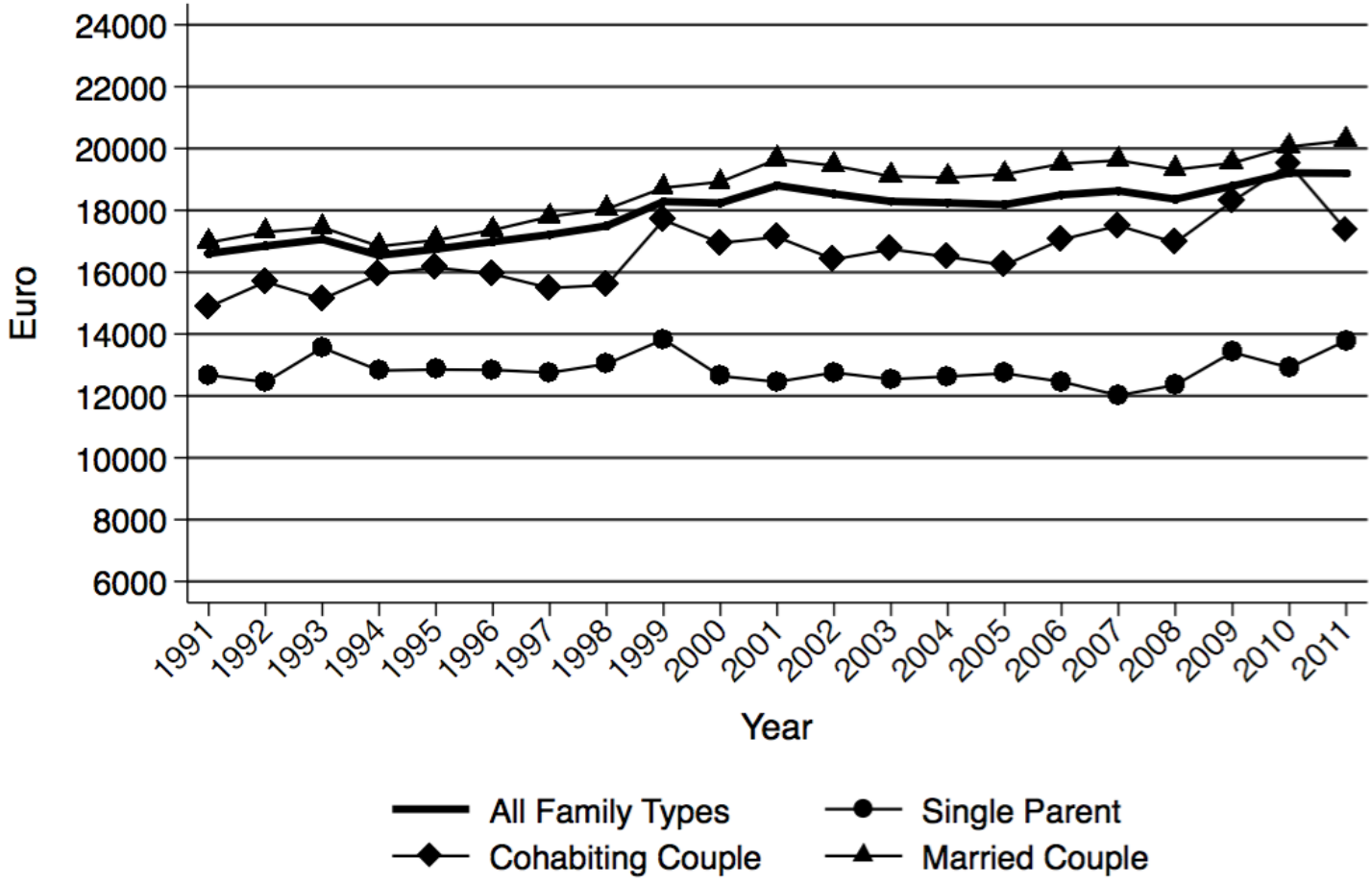
- Income inequality among children $\uparrow$ between 1991 and 2011, while inequality in non-parental childcare time strongly $\downarrow$.
- Multidimensional measures $>$ univariate measures based on income, if we assume dimensions not to be perfectly substitutable.
- Multidimensional poverty and inequality $\downarrow$ between 1991 and 2011
- The decline seems to be driven by the expansion of publicly provided childcare that reduced inequality along this dimension.
- Assuming higher degrees of substitutability between the four dimensions, the declining trend almost disappears, but remains significant.
- Even if we increase the income weight in our multidimensional measures to 90 percent and assume $\beta < 1$, we cannot replicate the increasing inequality and poverty trend observed for income only.

Thank you for your attention!

Number of Observed Children by Family Type

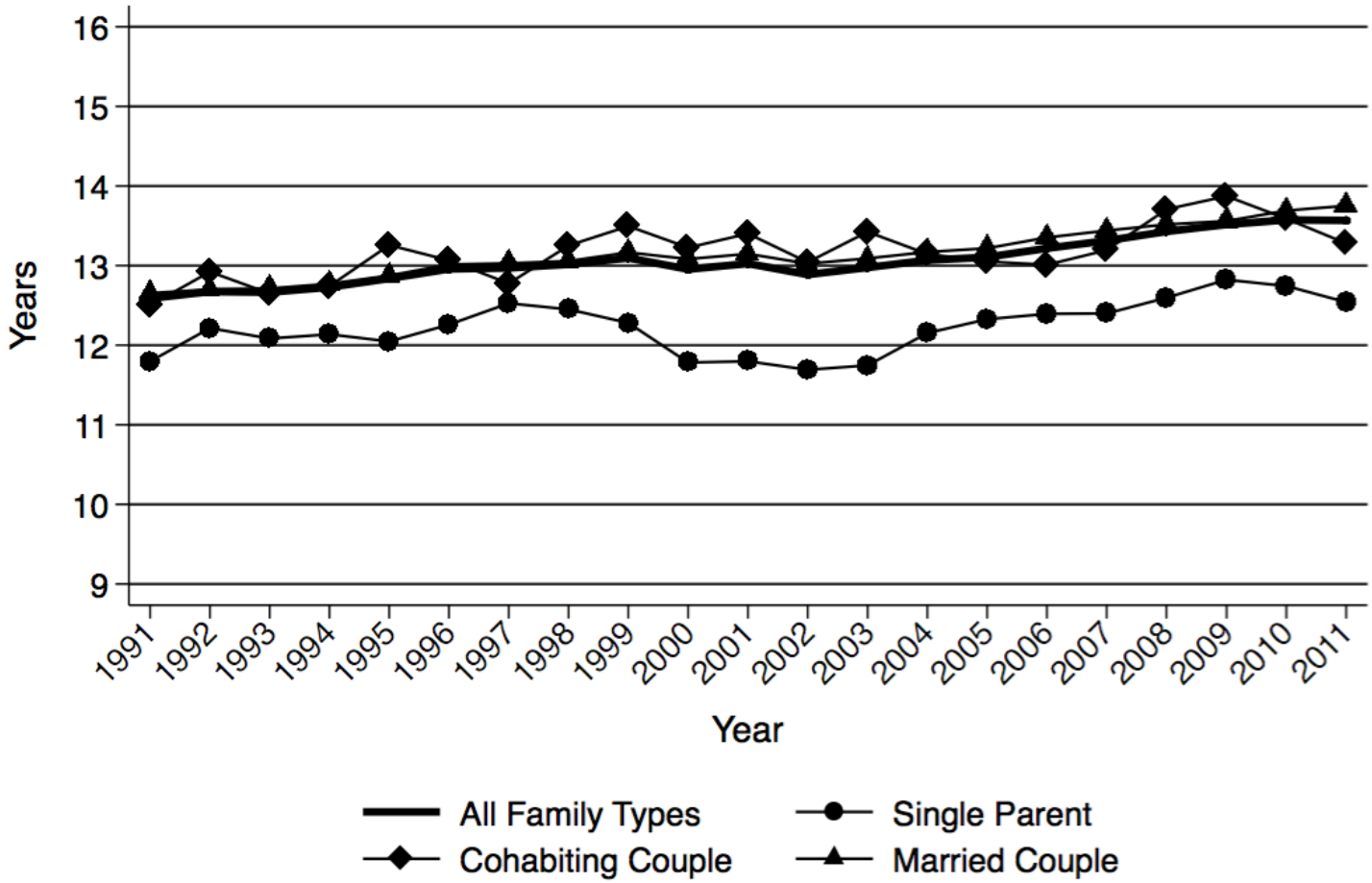
Year	Single Parent	Cohabiting Parents	Married Parents	Total
1991	161	84	2,731	2,976
1992	175	80	2,632	2,887
1993	164	88	2,491	2,743
1994	160	99	2,548	2,807
1995	156	112	2,542	2,810
1996	166	103	2,443	2,712
1997	190	99	2,273	2,562
1998	206	122	2,466	2,794
1999	187	130	2,336	2,653
2000	346	201	3,839	4,386
2001	305	234	3,426	3,965
2002	292	246	3,558	4,096
2003	255	231	3,318	3,804
2004	252	233	3,023	3,508
2005	253	230	2,771	3,254
2006	302	247	2,833	3,382
2007	258	231	2,599	3,088
2008	241	225	2,333	2,799
2009	279	231	2,382	2,892
2010	209	177	1,906	2,292
2011	311	209	2,190	2,710
Total	4,868	3,612	56,640	65,120

Trends by Family Type | Parental Income (1)



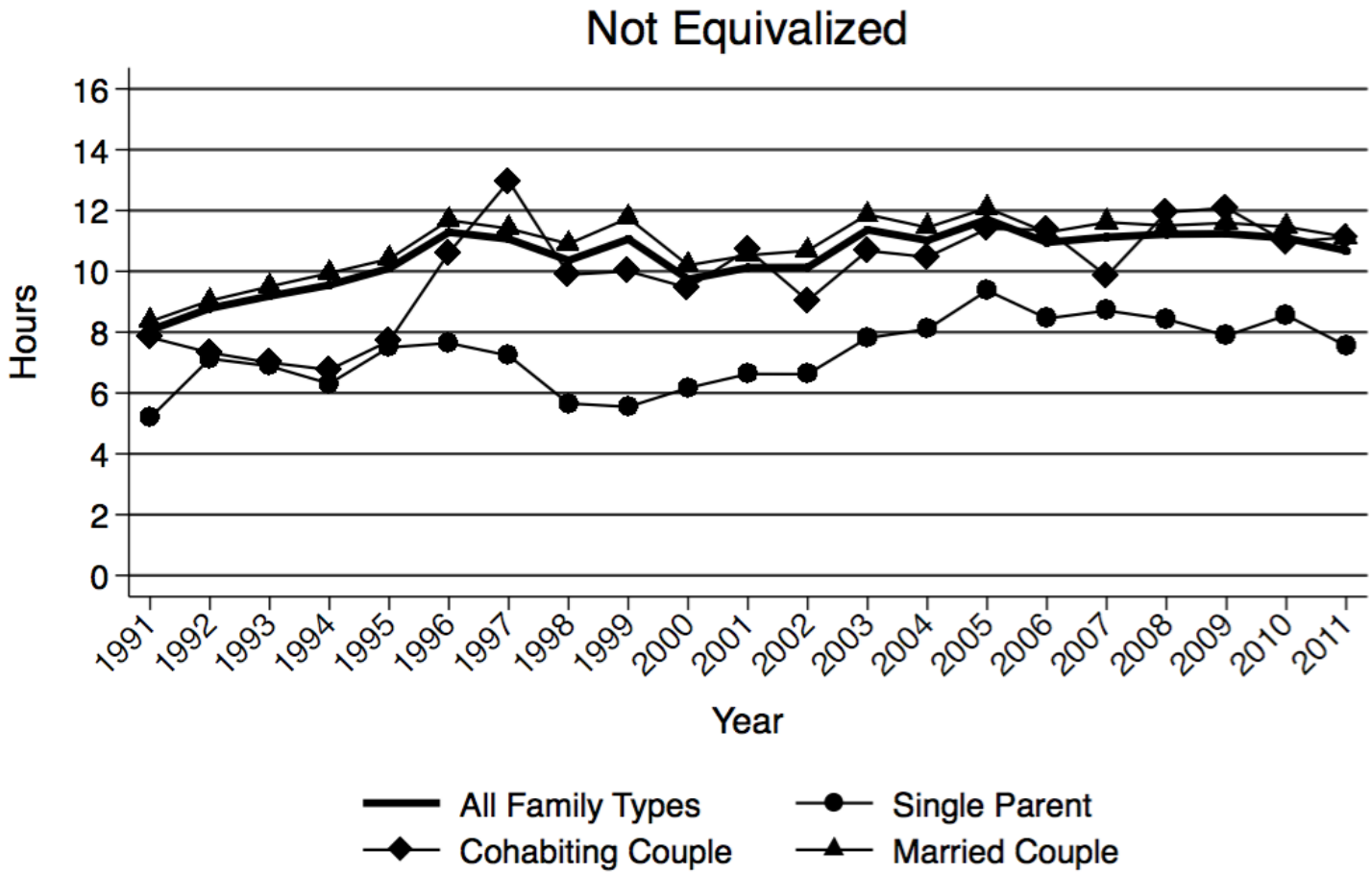
Source: Own calculations, SOEPv29. *Note:* Incomes are real equivalent net incomes using the modified OECD scale in prices of 2005.

Trends by Family Type | Parental Education (2)



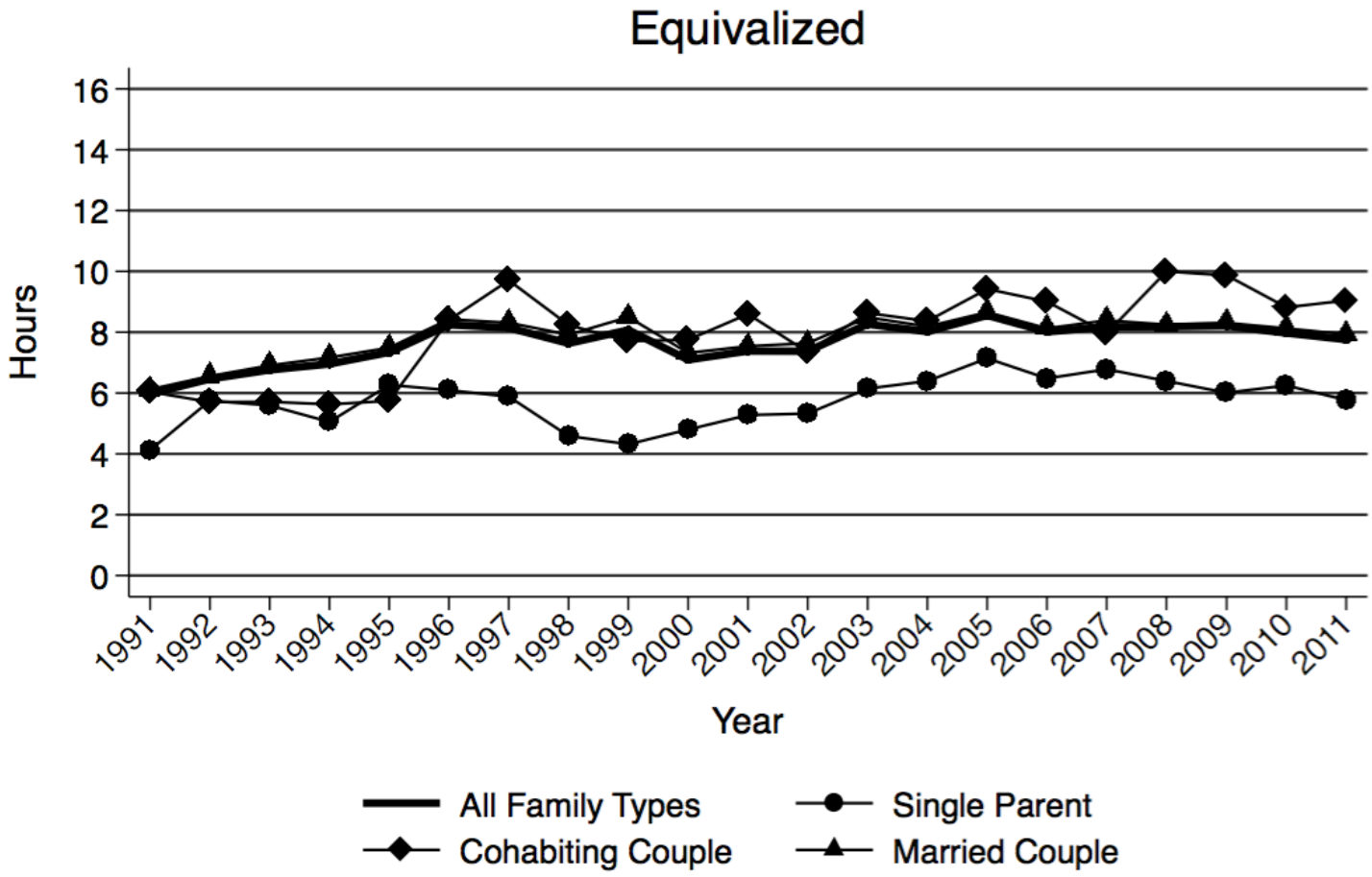
Source: Own calculations, SOEPv29. *Note:*Spouse with highest number of years of education.

Trends by Family Type | Parental Time (3)



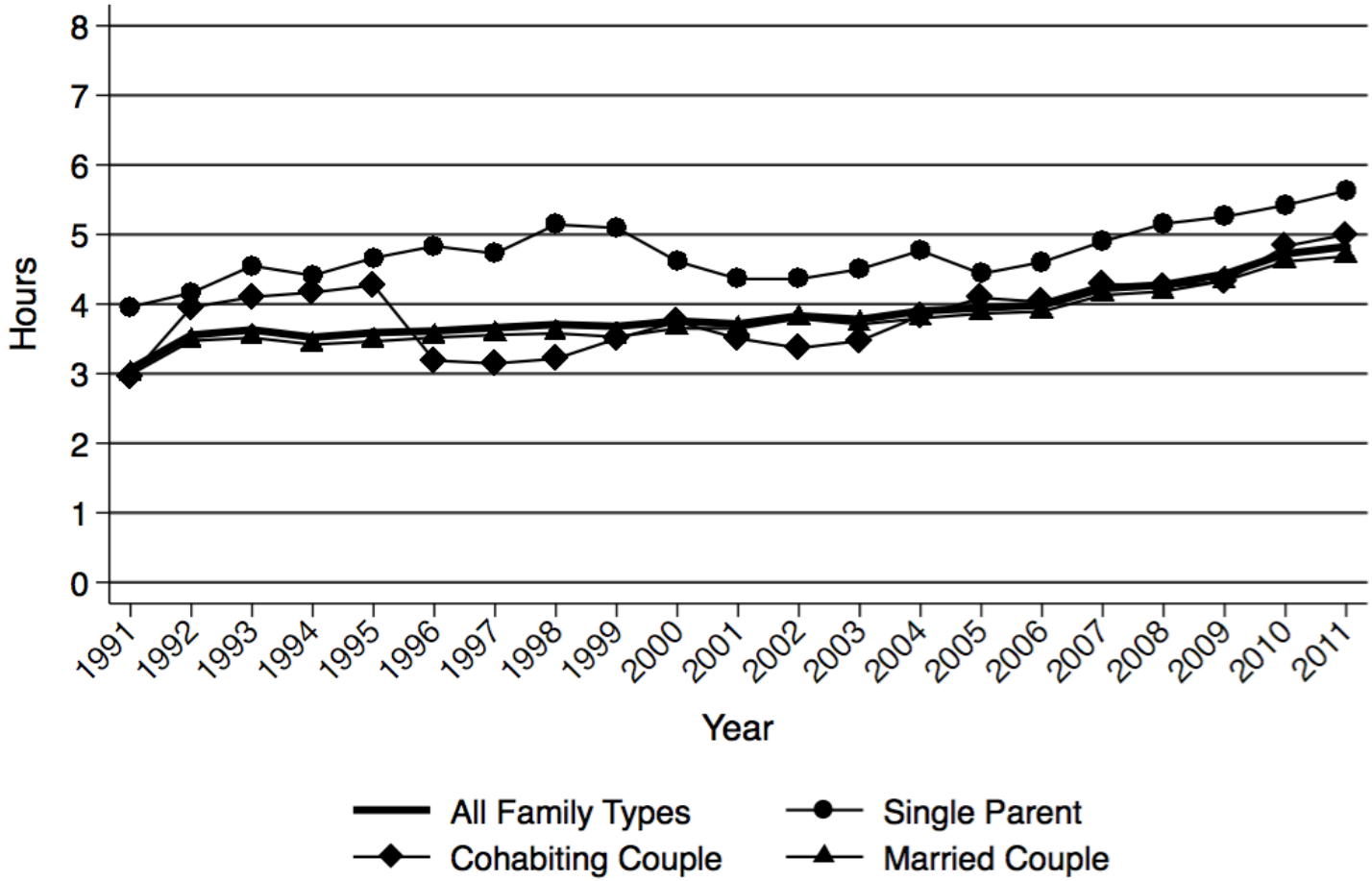
Source: Own calculations, SOEPv29.

Trends by Family Type | Equivalent Parental Time (3)



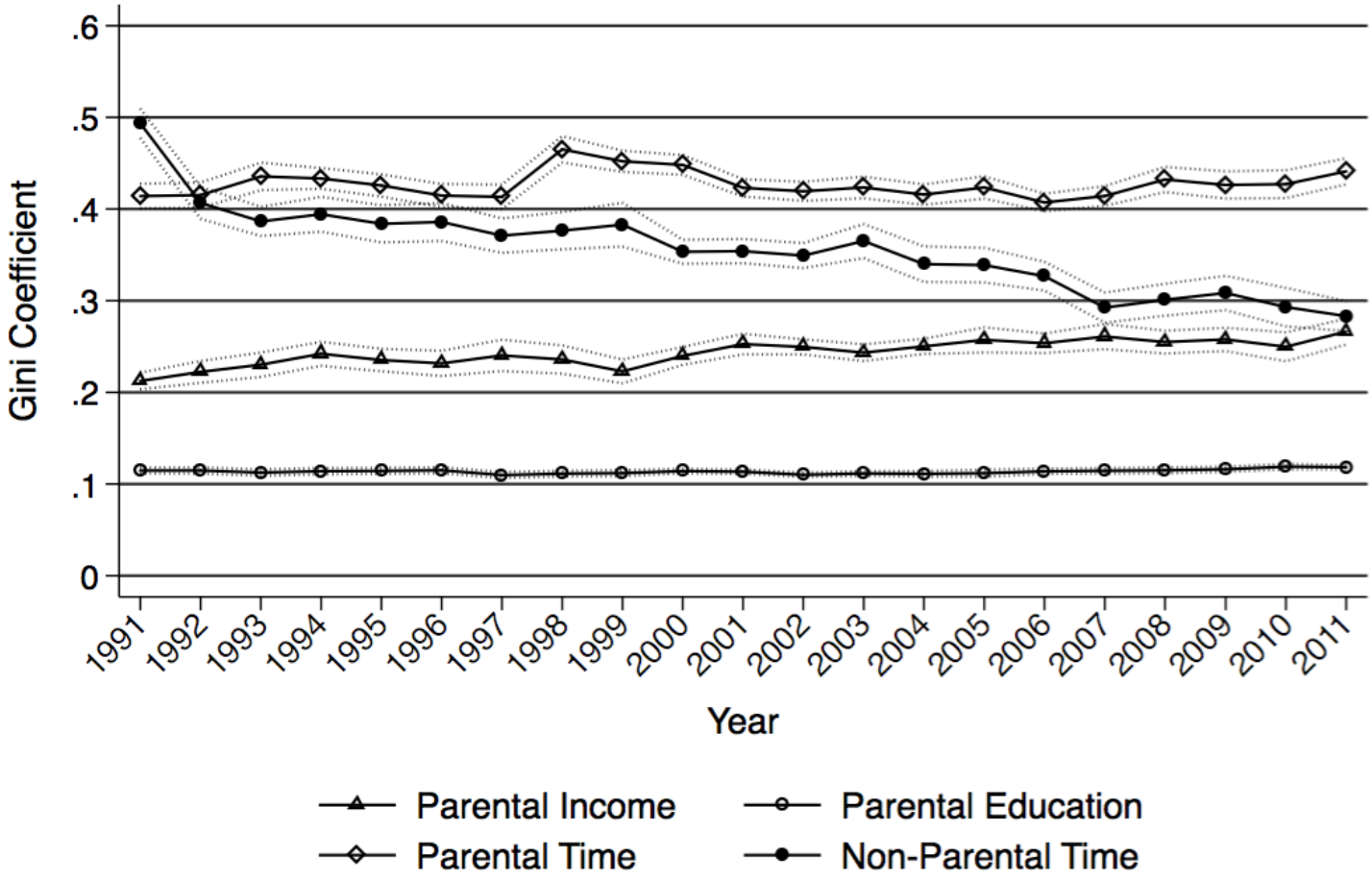
Source: Own calculations, SOEPv29. *Note*: Parental childcare time is weighted by the number of siblings using to the square root scale.

Trends by Family Type | Non-parental Time (4)



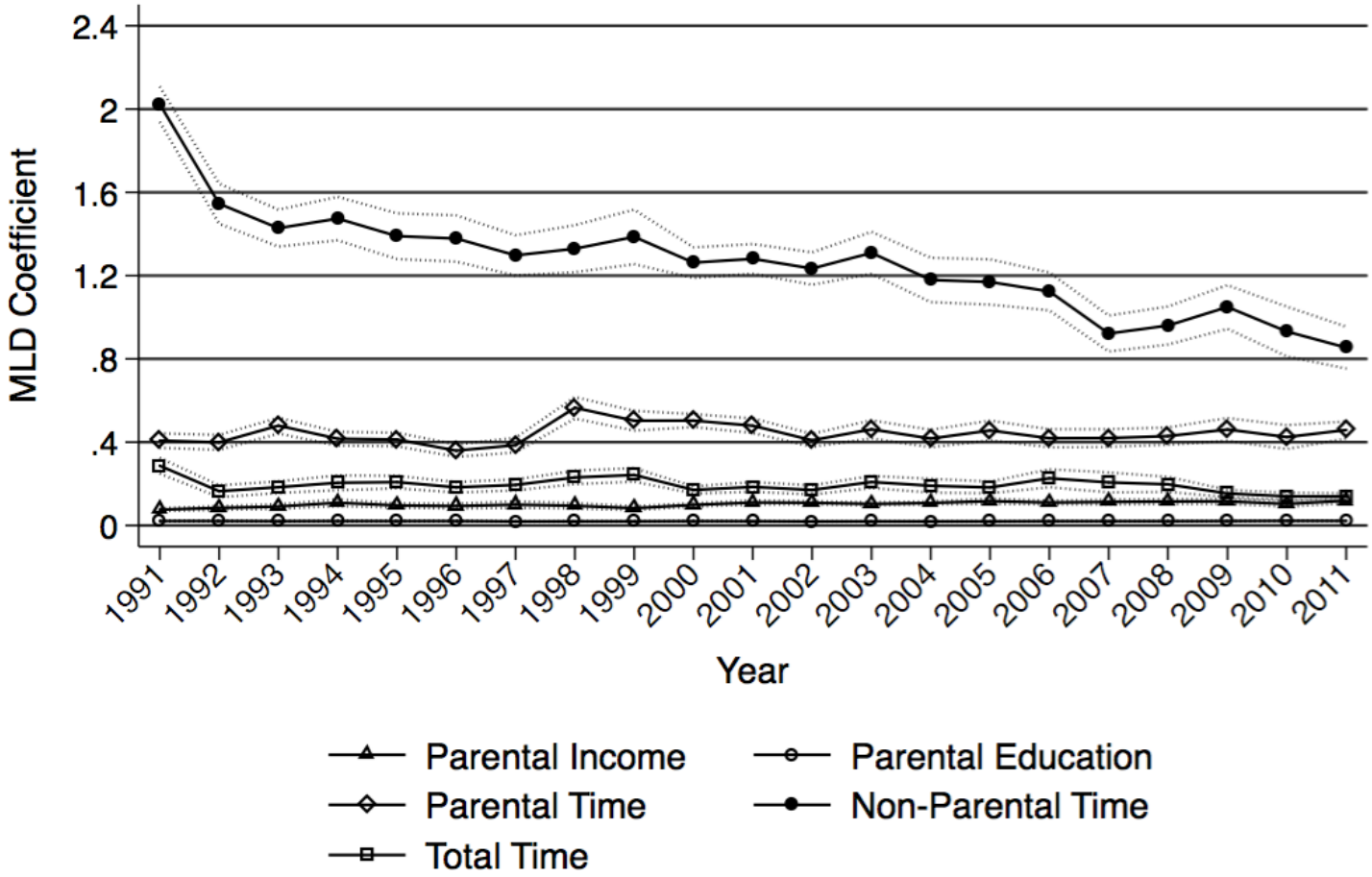
Source: Own calculations, SOEPv29.

Univariate Inequality | Gini



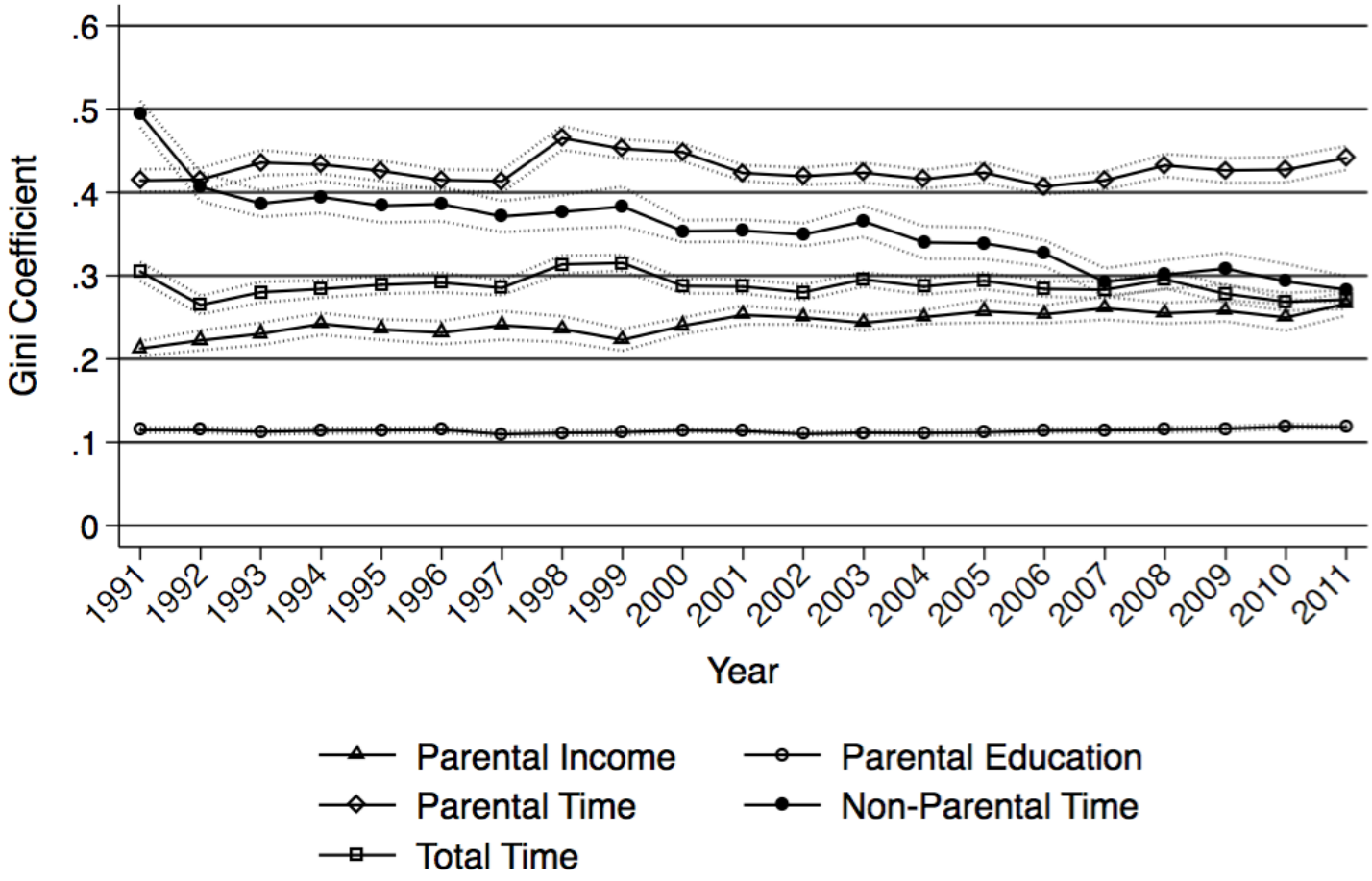
Source: Own calculations, SOEPv29.

Univariate Inequality | MLD



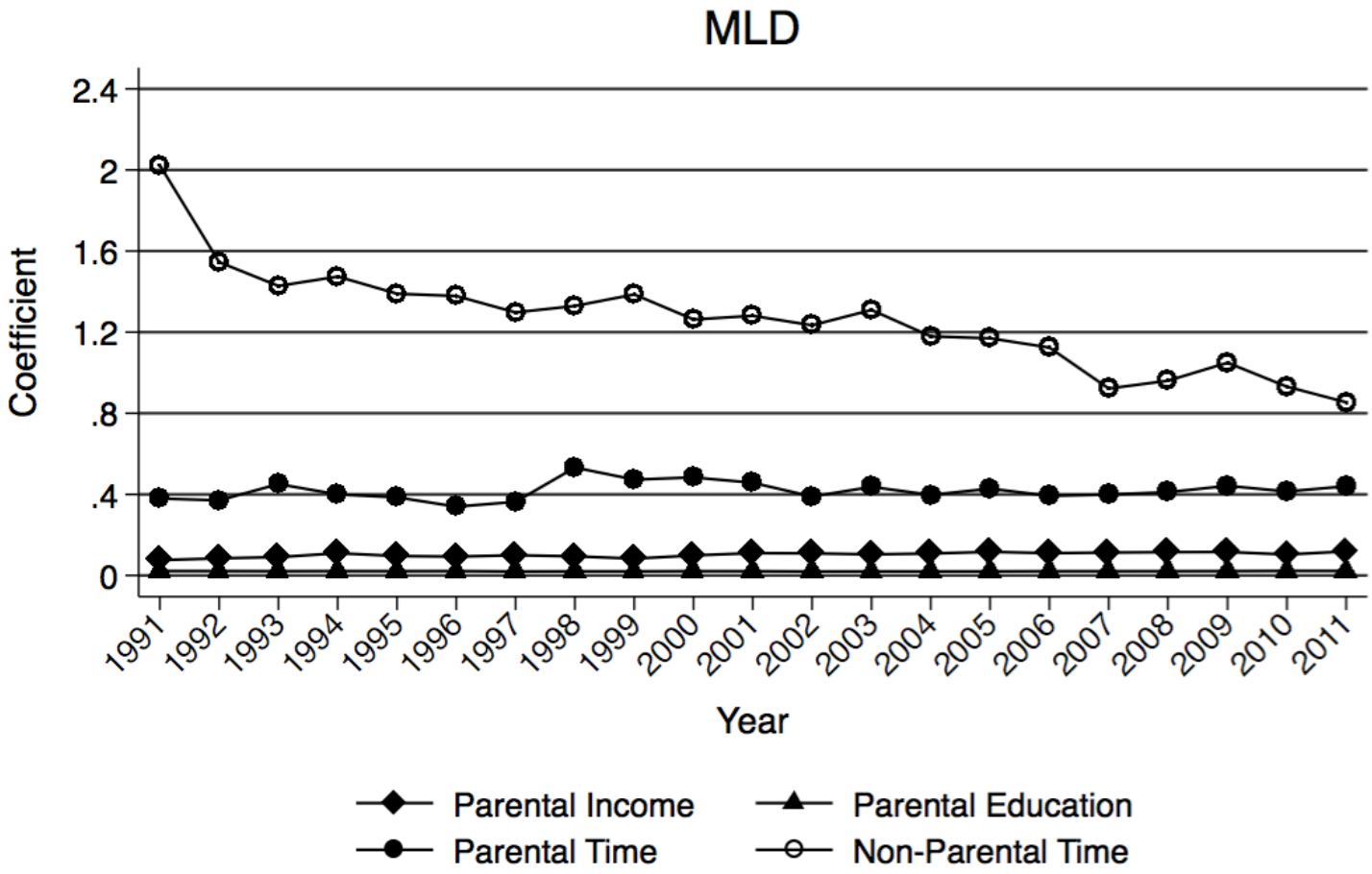
Source: Own calculations, SOEPv29.

Univariate Inequality | Gini



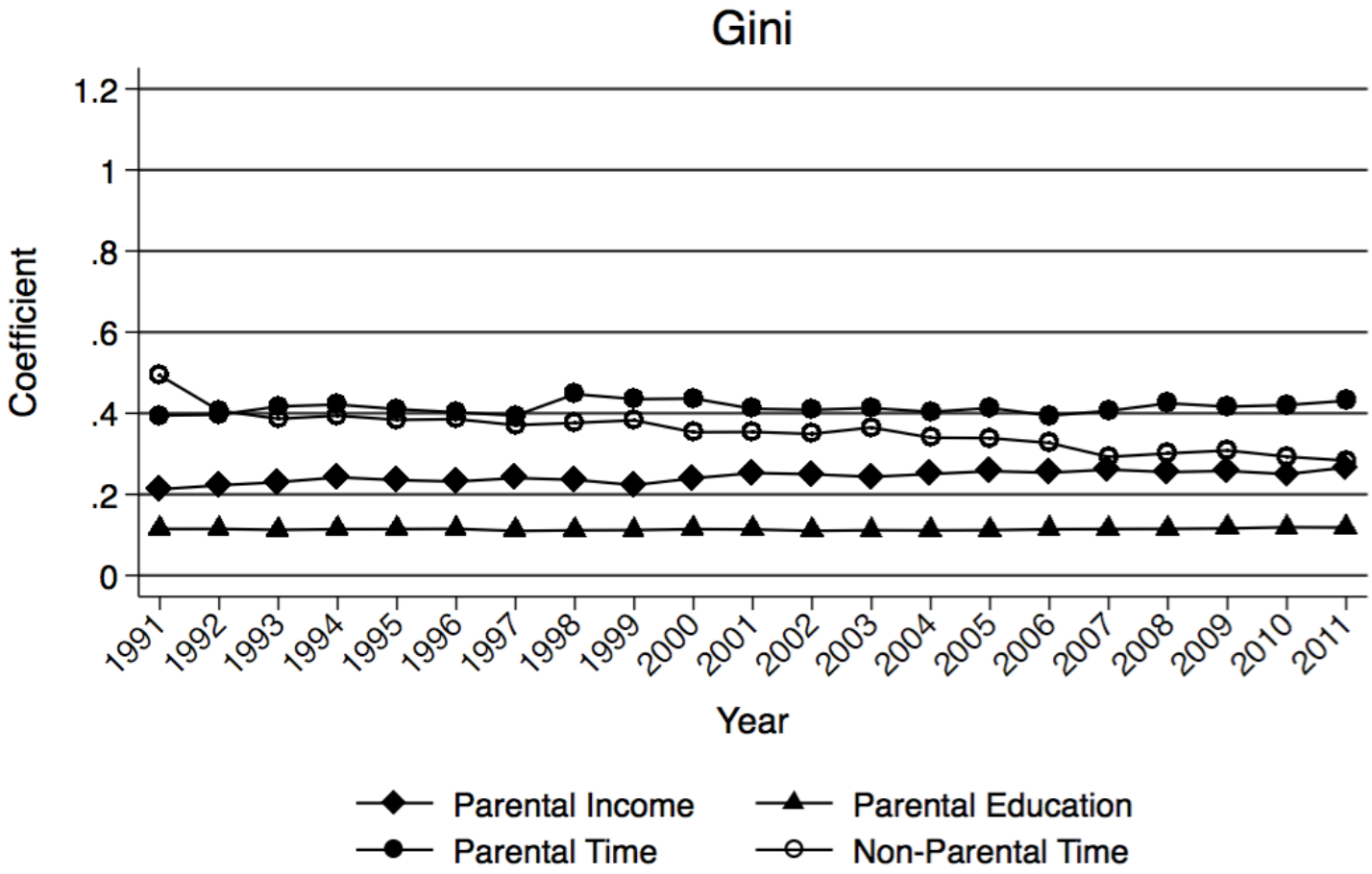
Source: Own calculations, SOEPv29.

Univariate Inequality | Unadjusted Parental Time



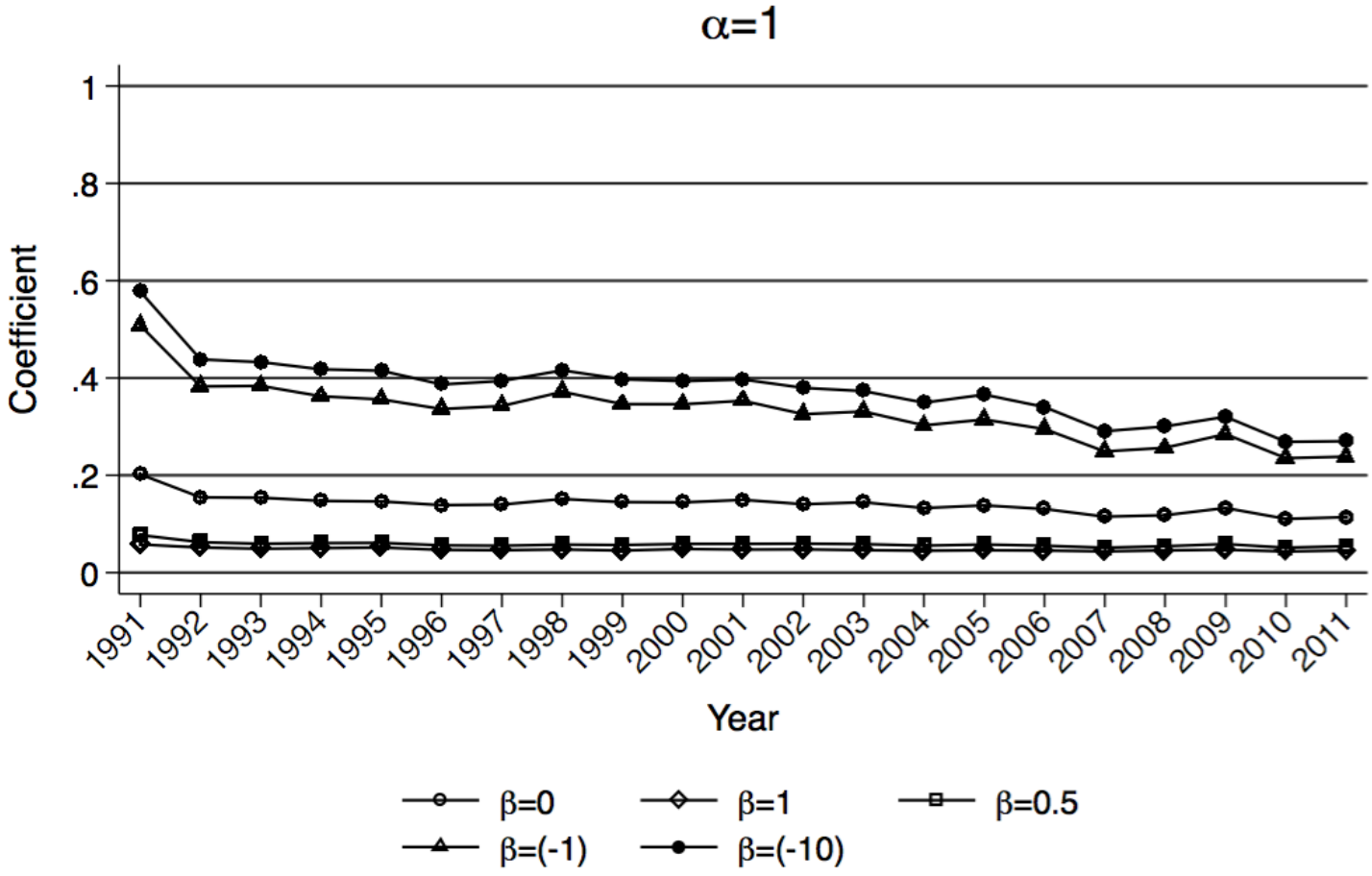
Source: Own calculations, SOEPv29.

Univariate Inequality | Unadjusted Parental Time



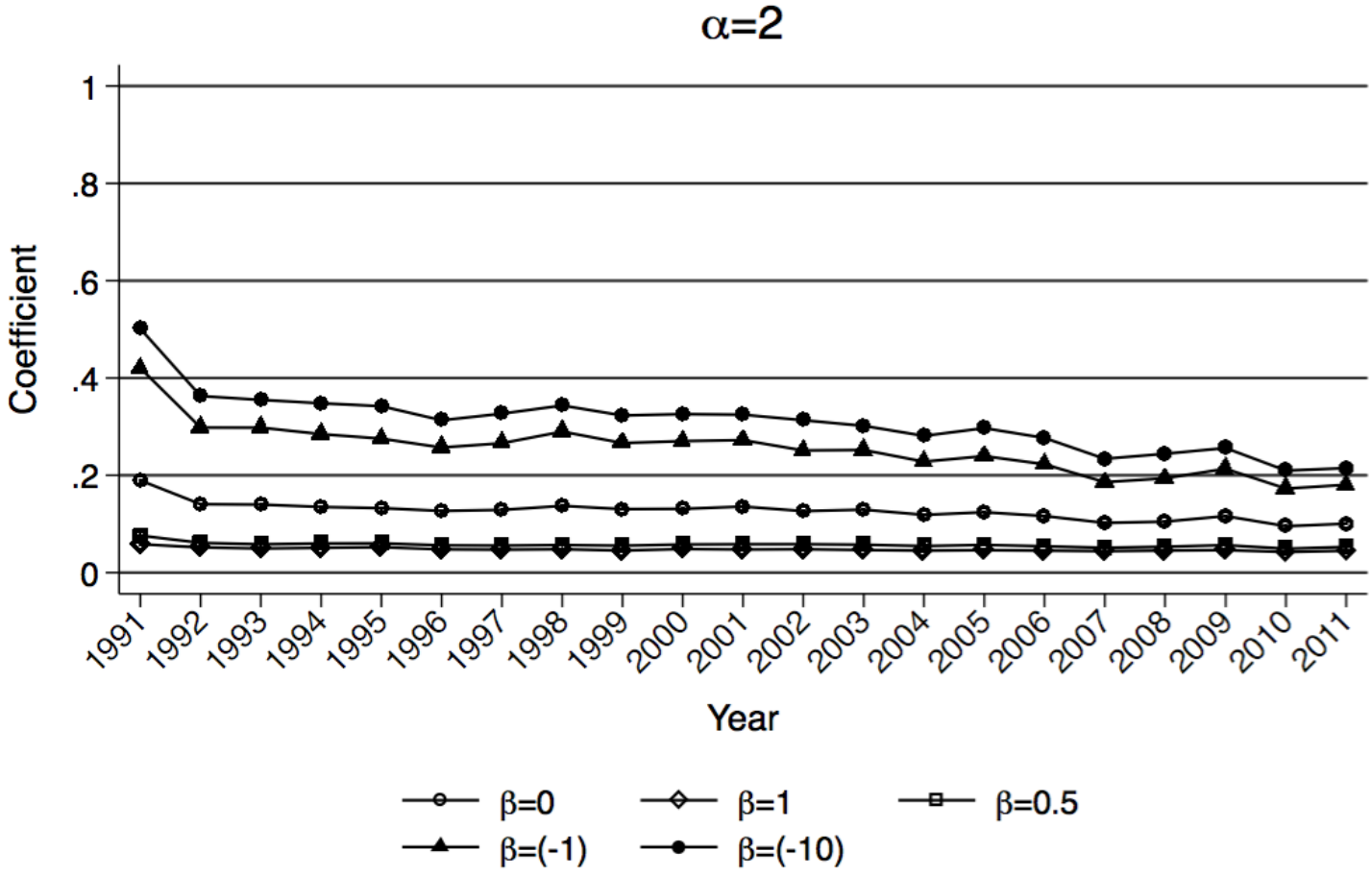
Source: Own calculations, SOEPv29.

Multidimensional Inequality | $\alpha = 1$



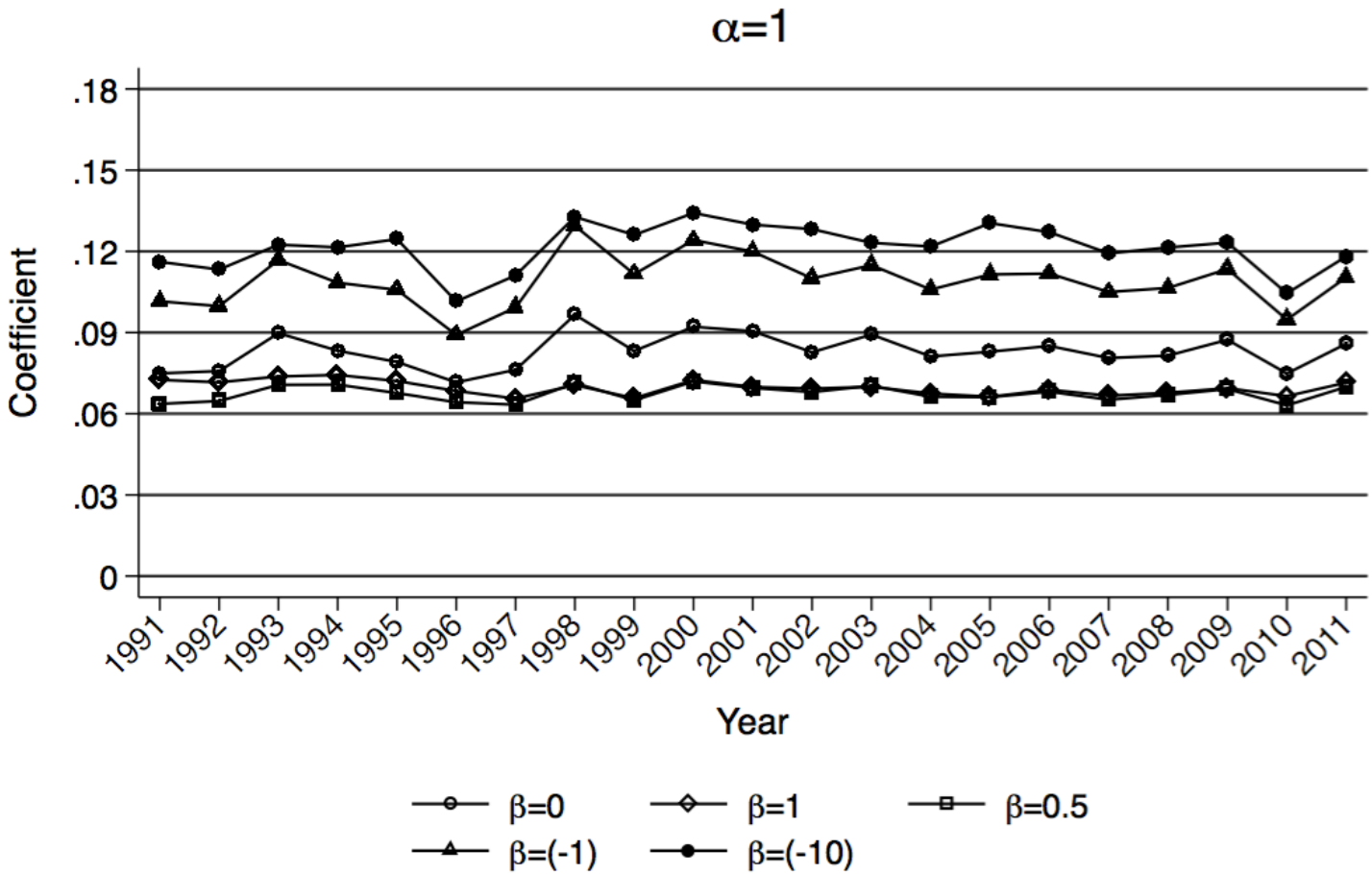
Source: Own calculations, SOEPv29.

Multidimensional Inequality | $\alpha = 2$



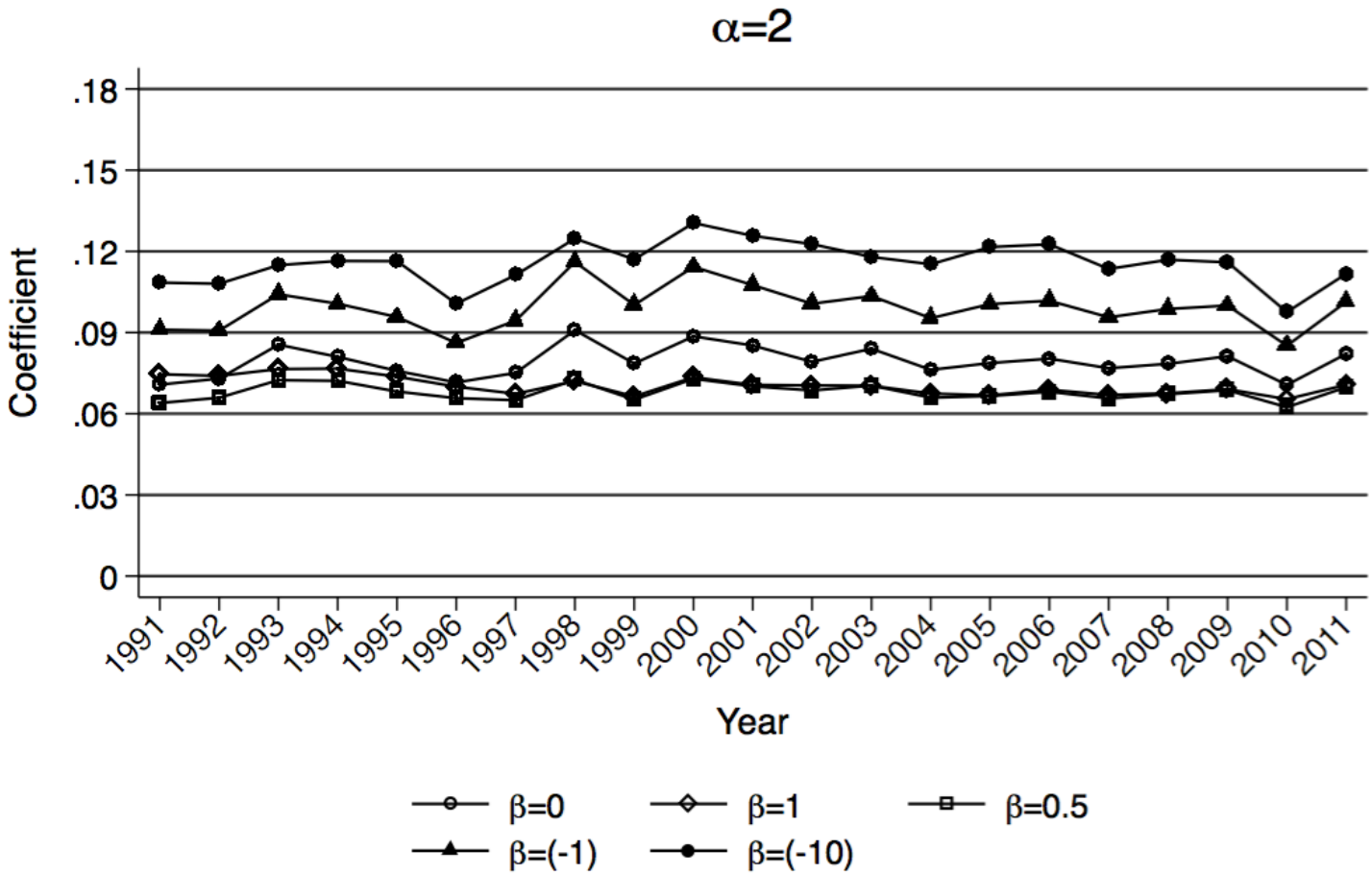
Source: Own calculations, SOEPv29.

Multidimensional Inequality | $\alpha = 1$ | Excl. Non-Parental Time



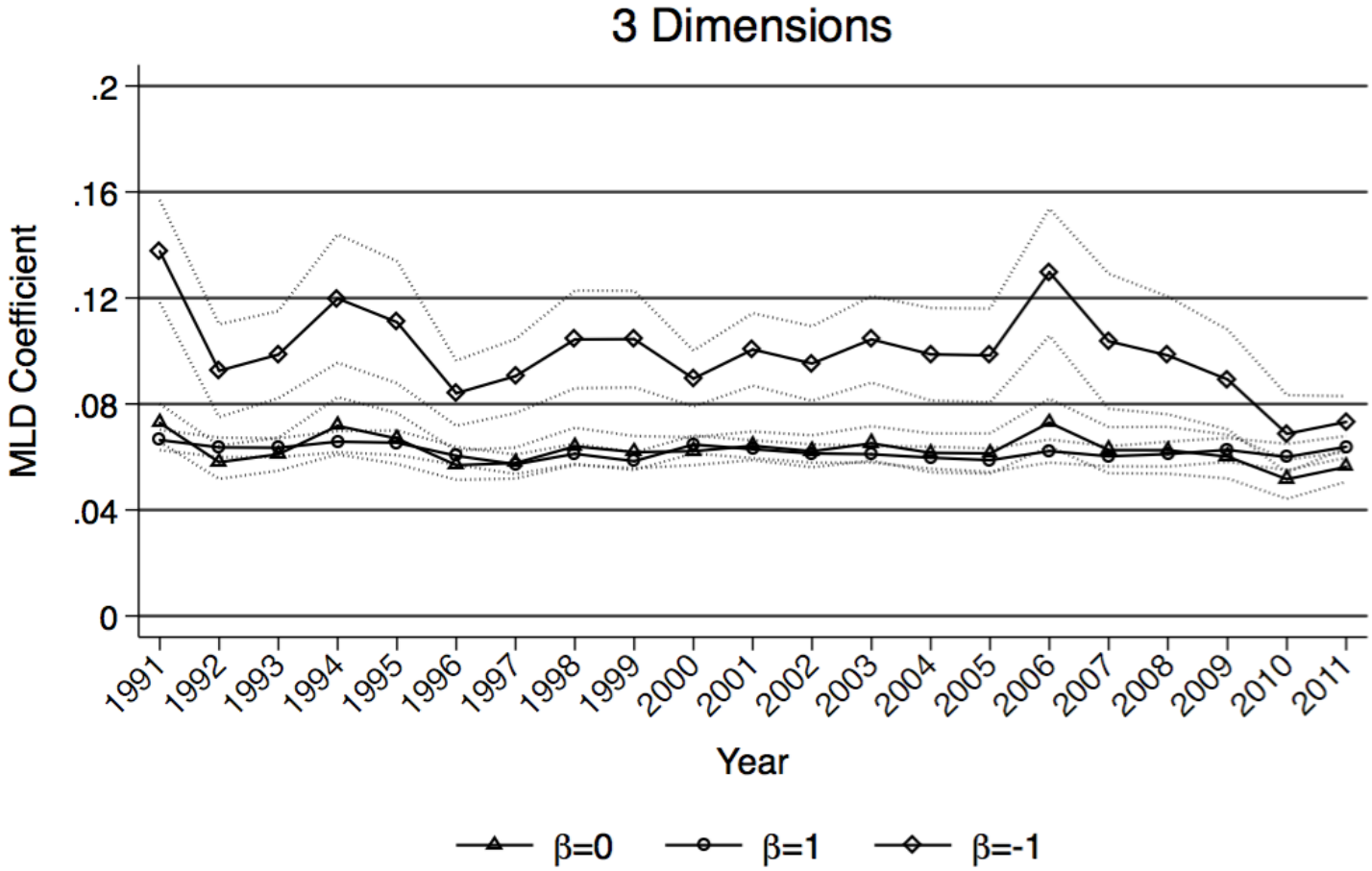
Source: Own calculations, SOEPv29.

Multidimensional Inequality | $\alpha = 2$ | Excl. Non-Parental Time



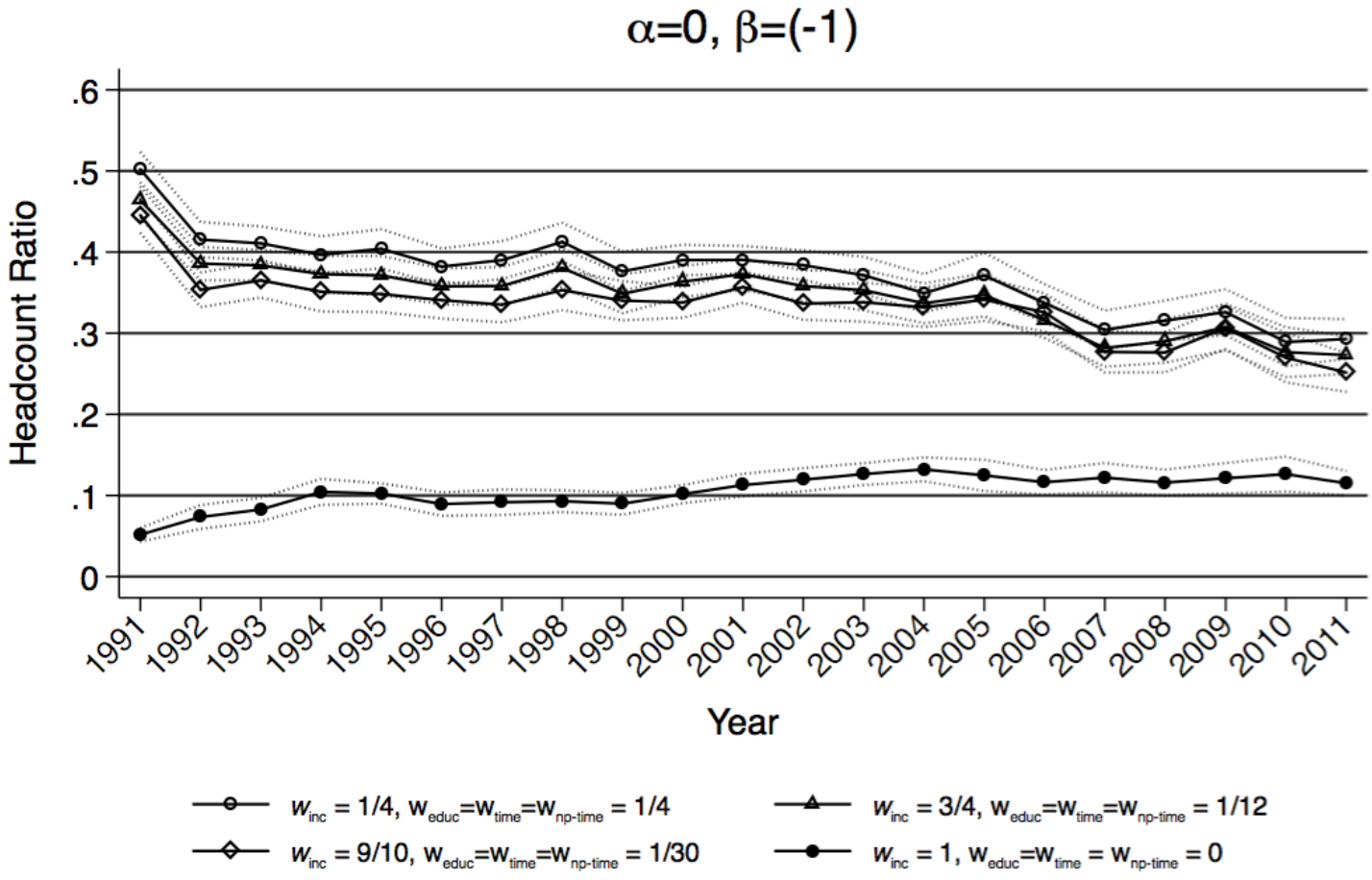
Source: Own calculations, SOEPv29.

Multidimensional Inequality | MLD



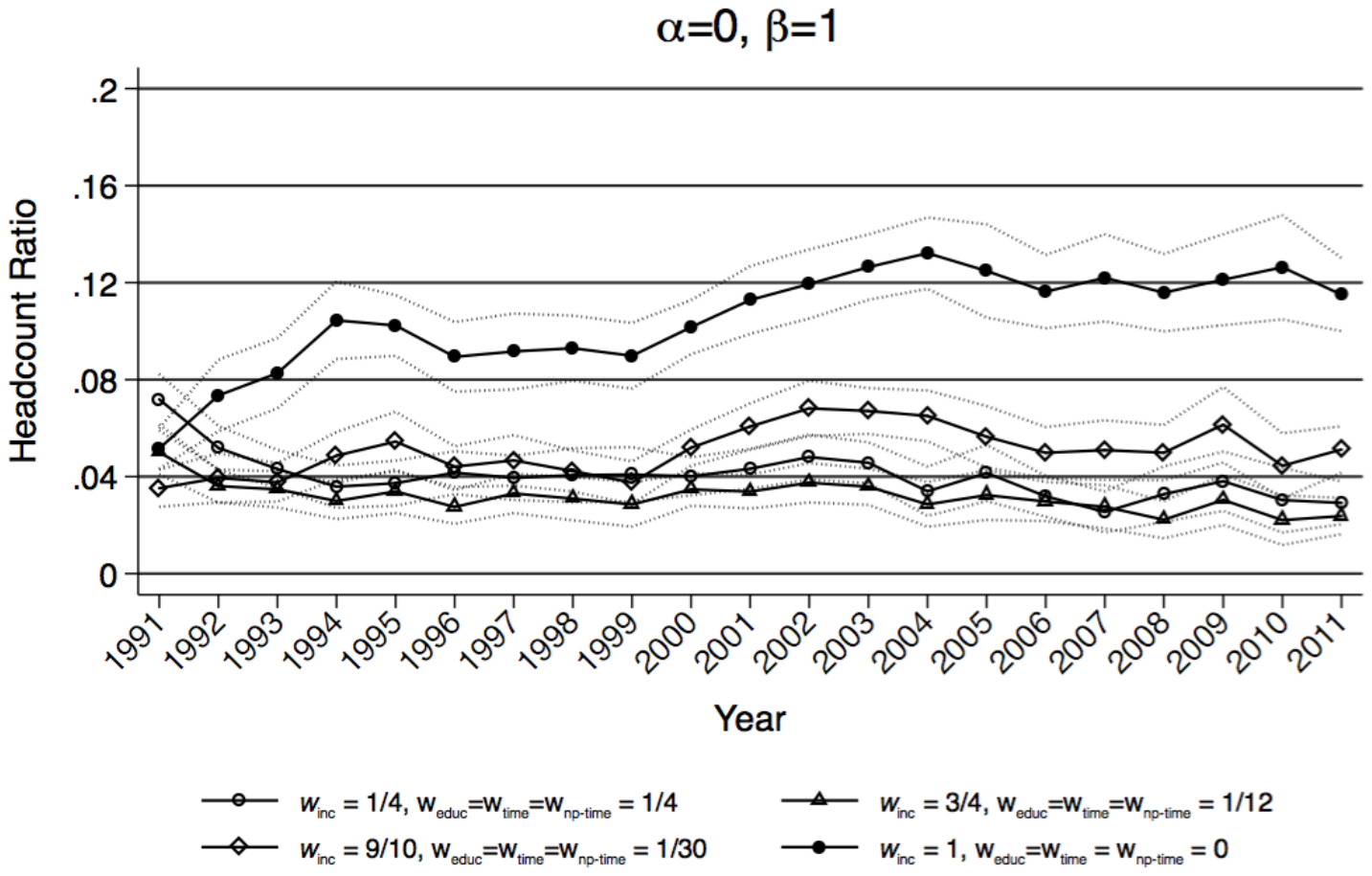
Source: Own calculations, SOEPv29.

Multidimensional Poverty | Weighting Structure



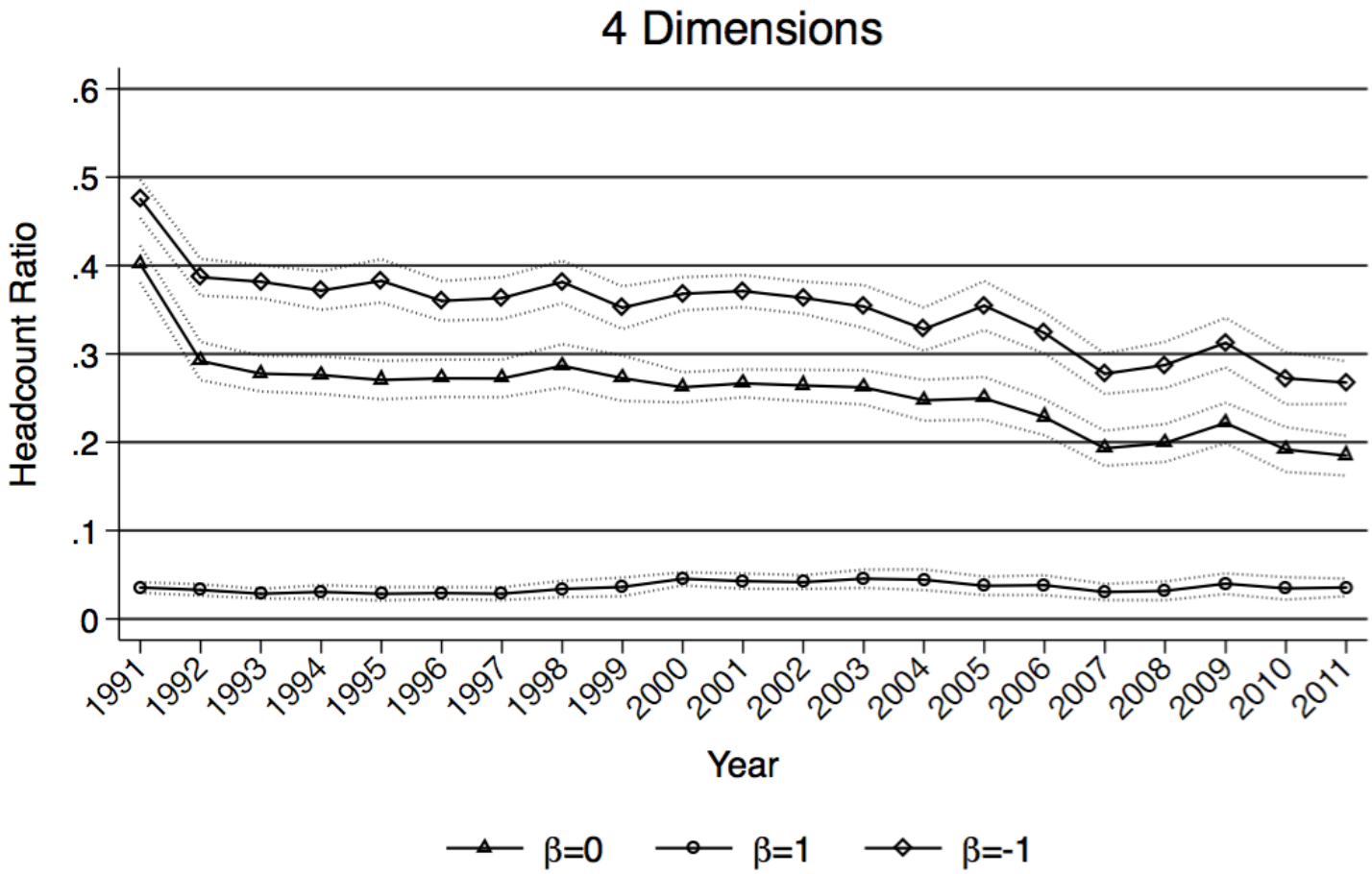
Source: Own calculations, SOEPv29.

Multidimensional Poverty | Weighting Structure



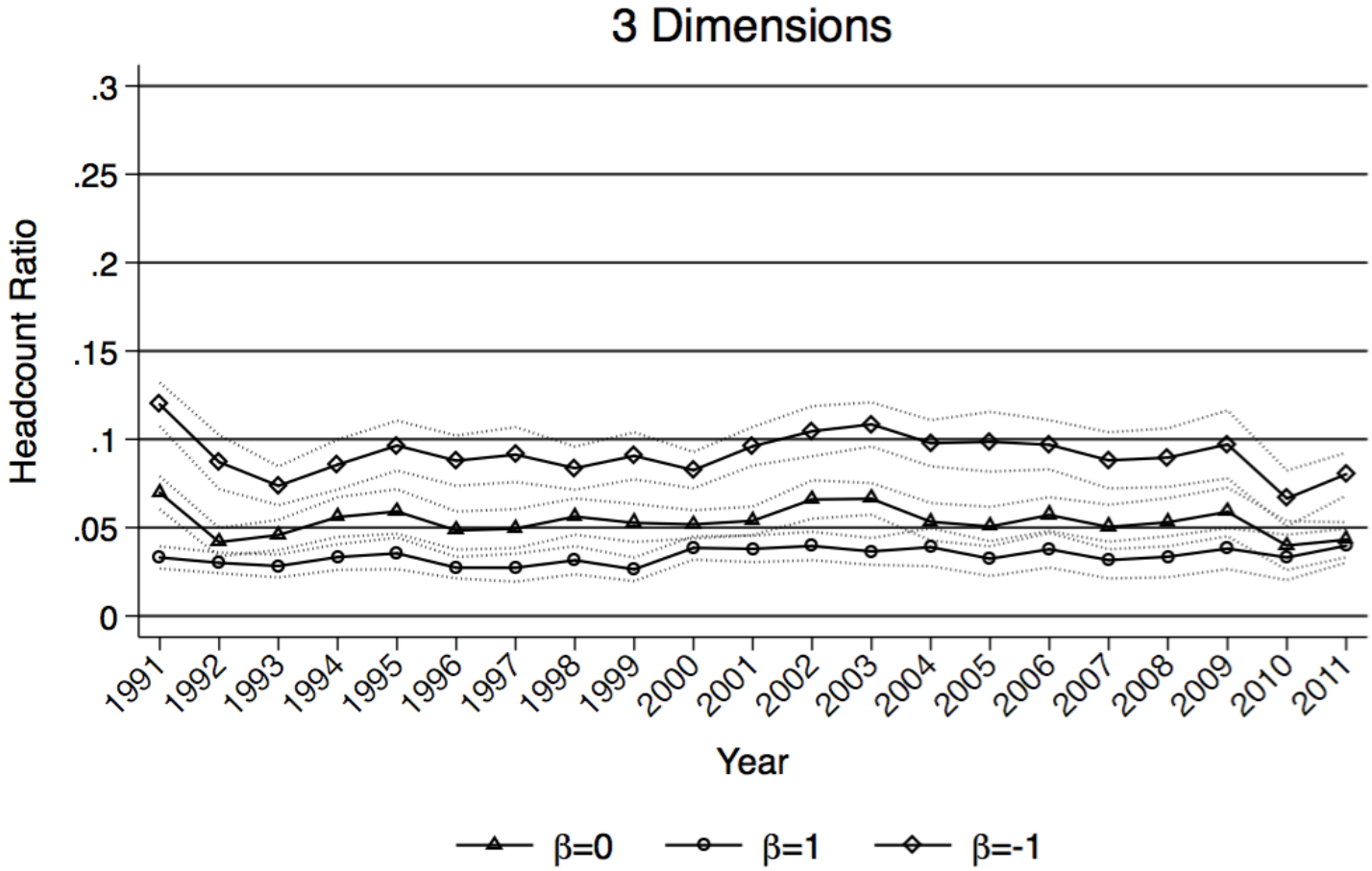
Source: Own calculations, SOEPv29.

Multidimensional Poverty | Frequency Based Weights



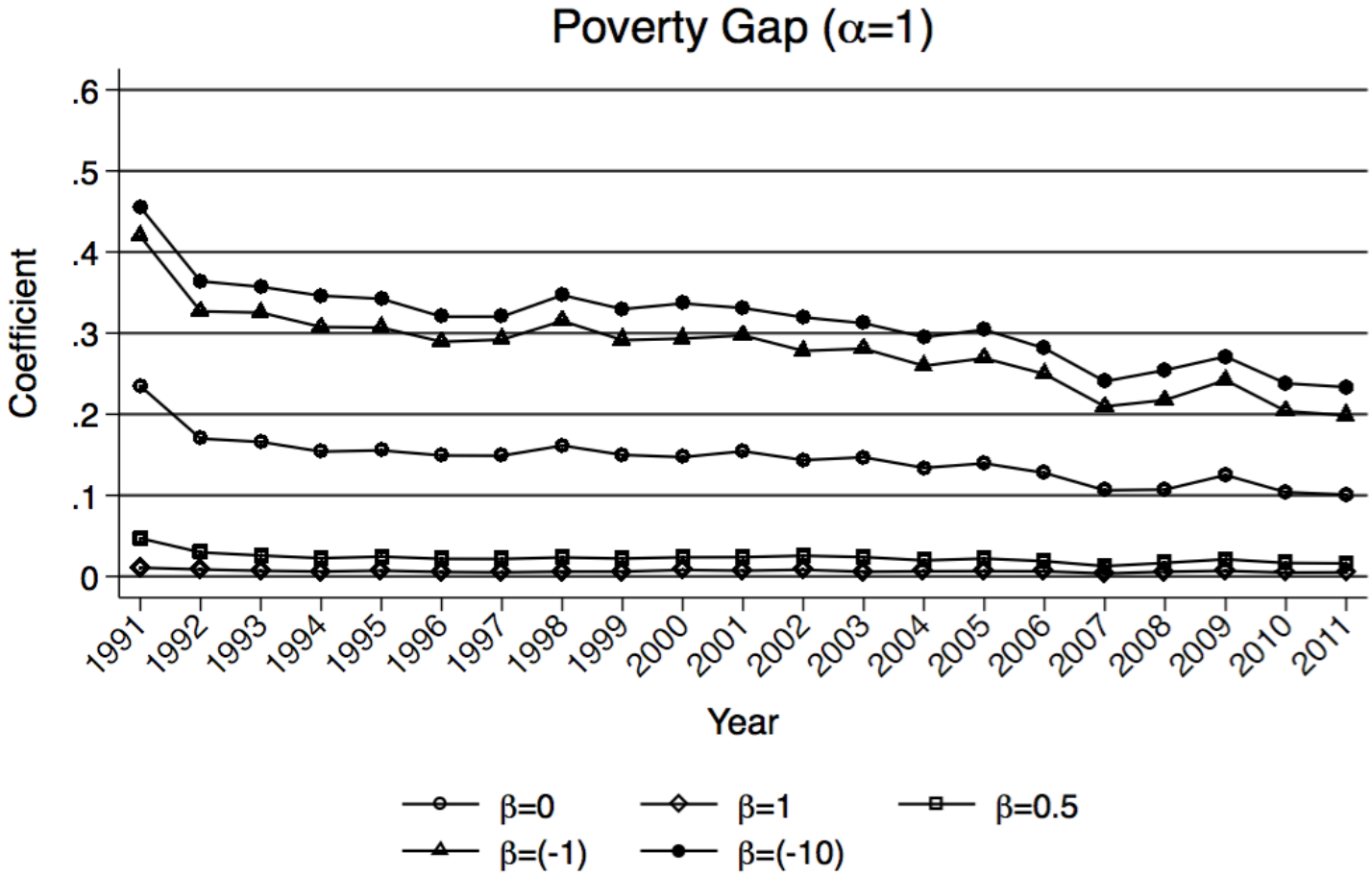
Source: Own calculations, SOEPv29.

Multidimensional Poverty | Headcount Ratio



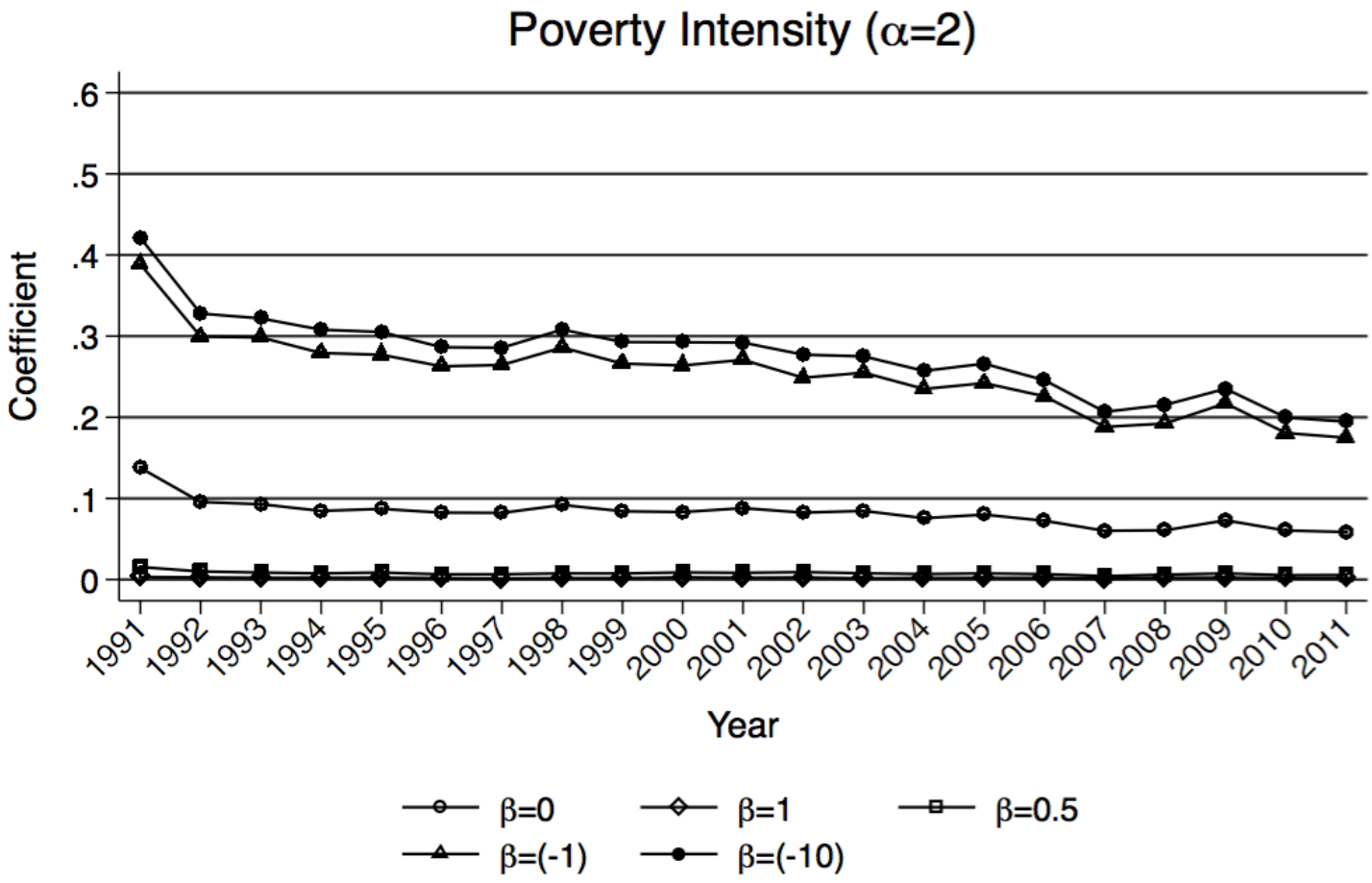
Source: Own calculations, SOEPv29.

Multidimensional Poverty | $\alpha = 1$



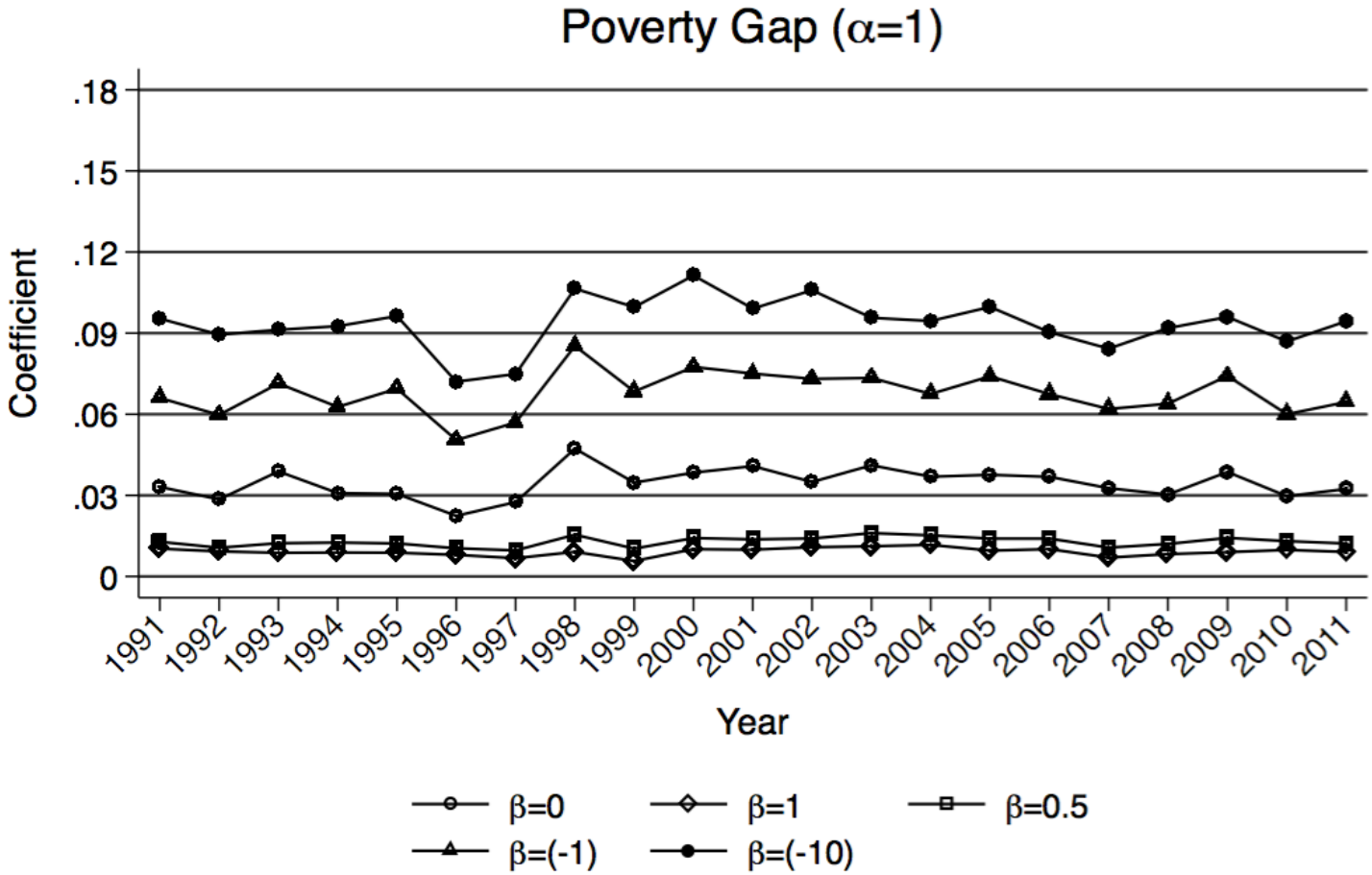
Source: Own calculations, SOEPv29.

Multidimensional Poverty | $\alpha = 2$



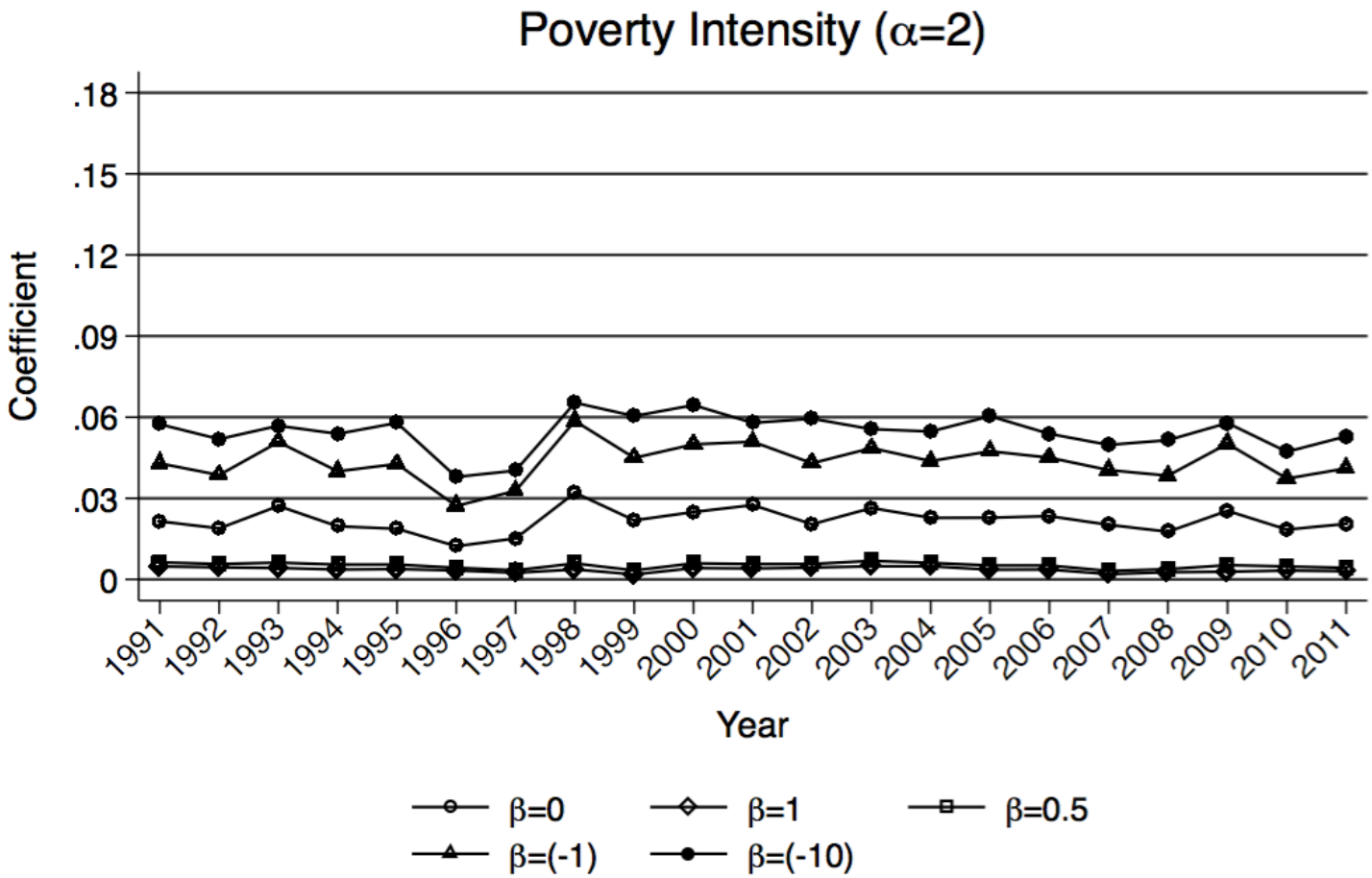
Source: Own calculations, SOEPv29.

Multidimensional Poverty | $\alpha = 1$ | Excl. Non-Parental Time



Source: Own calculations, SOEPv29.

Multidimensional Poverty | $\alpha = 2$ | Excl. Non-Parental Time



Source: Own calculations, SOEPv29.