

## RESEARCH ARTICLE

# Health expenditure of employees versus self-employed individuals; a 5 year study

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## Abstract

It is unclear to what extent self-employed choose to become self-employed. This study aimed to compare the health care expenditures—as a proxy for health—of self-employed individuals in the year before they started their business, to that of employees. Differences by sex, age, and industry were studied. In total, 5,741,457 individuals aged 25–65 years who were listed in the tax data between 2010 and 2015 with data on their health insurance claims were included. Self-employed and employees were stratified according to sex, age, household position, personal income, region, and industry for each of the years covered. Weighted linear regression was used to compare health care expenditures in the preceding (year  $x-1$ ) between self-employed and employees (in year  $x$ ). Compared with employees, expenditures for hospital care, pharmaceutical care and mental health care were lower among self-employed in the year before they started their business. Differences were most pronounced for men, individuals  $\geq 40$  years and those working in the industry and energy sector, construction, financial institutions, and government and care. We conclude that healthy individuals are overrepresented among the self-employed, which is more pronounced in certain subgroups. Further qualitative research is needed to investigate the reasons why these subgroups are more likely to choose to become self-employed.

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**KEYWORDS**

employees, follow-up, health care expenditure, health, self-employment

**JEL CLASSIFICATION**

J10

## 1 | INTRODUCTION

In Europe, approximately 14% of the working population consists of self-employed individuals (Hatfield, 2014). They form a heterogeneous group, ranging from freelance workers to household cleaners (Hatfield, 2014). Research studying the relation between self-employment and health most often suggest that the self-employed have a better health than employees (Andersson, 2008; Stephan & Roesler, 2010; Toivanen et al., 2018; Yoon & Bernell, 2013). One commonly mentioned explanation for this relationship is the so-called contextual effect of self-employment on health (Rietveld, van Kippersluis, & Thurik, 2015), which implies that self-employed individuals have more control over their working life than employees do. This would lead to less work stress and better health and well-being in general (Hessels, Rietveld, & Zwan, 2017). Another explanation may be a selection effect, in which healthier individuals are more likely to become self-employed (or start a business for themselves; Rietveld et al., 2015). Healthier individuals tend to be more able to look out for and take advantage of business opportunities or may have easier access to financing (Gielnik, Zacher, & Frese, 2012), as investors consider health as an important factor determining the investment risk.

On the other hand, it has also been suggested that individuals with health problems may have greater difficulties in finding suitable salaried work, which could eventually push them into self-employment (Verheul, Thurik, Hessels, & van der Swan, 2010; Zissimopoulos & Karoly, 2007). Indeed, some studies suggest that self-employed have worse health than employees (Jamal, 1997; Parslow et al., 2004). Previous studies have further shown that, in comparison to employees in permanent jobs, self-employed individuals perceive a higher job insecurity (Schaufeli, 2016), which may negatively impact health (Cottini & Ghinetti, 2018). As in the Netherlands sickness and disability insurance provided by the social security system are not mandatory for self-employed individuals (as it is for employees), they may also be exposed to increased loss of income risks associated with injury or sickness (Baker, 2018). While employed people who fall ill receive social benefits from day one forward, self-employed individuals receive these benefits only after 2 years. Furthermore, self-employed pay an income-dependent premium as required by the tax system, whereas for employees this is done by the employer (KIZO, 2012). Nevertheless, as in the Netherlands a universal health care coverage system is in place, access to health care services and individual costs related to insurance premiums, co-payments, and deductibles are not likely to be different for employed and self-employed individuals.

Given these contradictory findings, the relationship between health and self-employment is poorly understood. Furthermore, most earlier studies were cross-sectional in design, which limits the evidence on the direction in the relationship between health and self-employment. Longitudinal data are essential to disentangle the contextual effect of self-employment on health from a selection effect. Until now, two longitudinal studies have investigated which of these two effects prevails (Goncalves & Martins, 2018; Rietveld et al., 2015), but these studies do not allow an unambiguous conclusion. In the longitudinal health and retirement study, self-employed individuals were found to be healthier than employees, with less health problems, better self-reported health, and mental health (Rietveld et al., 2015). This cross-sectional association remained when controlling for health history. However, based on longitudinal analyses, they found no effect of self-employment on health. The authors therefore concluded that a contextual effect of self-employment on health can be ruled out, and that comparatively healthier individuals are more likely to choose to be self-employed. This finding should be interpreted with some restraint, as their study population was not representative for the entire working age population in the United States. The second longitudinal study identified was based on hospital admission data from Portugal and confirmed the better health of self-employed individuals (Goncalves & Martins, 2018). This effect remained as follows: (1) when controlling for health history and (2) in their longitudinal analyses of the relation between self-employment and health. These findings therefore suggest a positive selection of the healthy into self-employment, but also provide evidence for a contextual effect, given their observed longitudinal association between self-employment and health. However, as both studies did not consider detailed aspects of health history, residual confounding cannot be ruled out. So far, no studies have investigated the existence of a selection effect by comparing health of employees with that of self-employed before they started their business.

Therefore, the purpose of our study was to examine whether healthier individuals are more likely to choose self-employment. To do so, we will focus on individuals who recently became self-employed and, we will investigate whether self-employed individuals have lower health care expenditures in the year before they started their business, than employees. Health care expenditure was used as a proxy for health as has been done in human capital literature (Rivera & Currais, 1999). Because self-employed individuals are a heterogeneous group, we also evaluated whether differences varied by age, sex, and industry sector.

## 2 | METHODS

### 2.1 | Study population and procedure

Annual data on employment status (self-employed or employed) were obtained from tax registers from Statistics Netherlands between 2010 and 2015. These data were linked to data on health care expenditure between 2009 and 2014 (in the previous year), obtained from Vektis, which collects and manages claims data of all Dutch health insurance companies. The Vektis database covers the health care expenditures of all insured in the Netherlands, which includes 99% of all Dutch residents ( $\pm 17$  million people; de Boo, 2011). In the present analyses, the study population consisted of individuals aged 25–65 years who were listed in the tax registers between 2010 and 2015, were insured and for whom accurate health care expenditure data (including those with a health expenditure of 0 euros) between 2009 and 2014 were available. We excluded those who were institutionalized or had no personal income, giving a total of 6,140,310 eligible individuals for the present analysis. This is equal to almost 70% of the labor force between 2010 and 2015 (CBS, 2019a, 2019b, 2019c, 2019d). The 30% of the potential labor force not covered by this dataset thus consisted of institutionalized individuals or individuals with no personal income. As these individuals were therefore not eligible for the present study, selection bias is unlikely to be present.

### 2.2 | New self-employed and employees

Newly self-employed were defined as those who were self-employed for at least 1 year between 2010 and 2015 (year  $x$ ), whose main annual source of income was from self-employment (own-account workers, director, and major shareholder or other kinds of self-employment without having employees), who had a different position in the labor force (e.g., employee) or graduated from high school, college, or university in the previous year (year  $x-1$ ) and had not been self-employed for at least the 2 previous years (year  $x-2$  and  $x-1$ ). Employees were defined as individuals who were employed for at least 1 year between 2010 and 2015 (year  $x$ ), with a main annual source of income from labor as an employee, and who were employee (either for a different employer) in the previous year (year  $x-1$ ) and had not been self-employed for at least 2 previous years (year  $x-2$  and  $x-1$ ).

### 2.3 | Health care expenditure

Health care expenditures were operationalized as expenditures for the following five types of care: general practice (GP) care (excluding the registration fees), hospital care, pharmaceutical care, mental health care, and allied health care, which is care provided by professionals such as physiotherapists, speech therapists, and dieticians. All health care expenditures per capita were expressed in euros (€) per year (2010–2015).

### 2.4 | Other variables

Data on age and sex were obtained from the Dutch population registration (GBA). Age was categorized into 5-year age groups. Household position, based on tax register data, was classified as breadwinner, breadwinner with partner, married partner, unmarried partner, child, or other household member. Region was considered as a variable in our analysis, because in the West of the Netherlands, the number of self-employed individuals is higher than in other regions (CBS, 2017). Region was based on the addresses and buildings key register and classified as North, East,

West, and South of the Netherlands. Standardized disposable personal income, based on tax registration data and divided into quintiles, indicated the purchasing power of a person. Finally, the industry sectors the employees and self-employed were working in were obtained from data registered by the Employee Insurance Agency (UWV, Polis register). The industry sectors were defined according to the Dutch standard industrial classification in 2008 (CBS, 2019a, 2019b, 2019c, 2019d) and divided into 10 categories: agriculture, forestry, and fishing; industry and energy; construction; trade, transport, hotels, and catering; information and communication; financial institutions; renting, buying, and selling real estate; business services; government and care; culture, recreation, and other services (see Table 2).

## 2.5 | Statistical analysis

To analyze differences in health care expenditure between self-employed and employees, stratification (or exact matching; Hansen, 2004; Ho, Imai, King, & Stuart, 2007; Rosenbaum, 1991) was used to derive weights for the statistical analyses. For each year separately (year  $x$ ), self-employed and employees were grouped into strata with exactly the same values for the variables sex (2 categories), 5 years age group (7 categories), household position (6 categories), quintile of personal income (5 categories), region (4 categories), and industry (10 categories). Within each stratum employees were given a weight proportional to the ratio of self-employed to employees. The weights of the employees were scaled such that the average weight among all employees was equal to 1. These weights compensate for the unequal numbers of employees versus self-employees in a stratum. Using the obtained weights, weighted linear regression analyses were performed to compare health care expenditures in the preceding year (at year  $x-1$ ) between newly self-employed and employees (i.e., as in year  $x$ ). Linear regression (OLS) methods were found suitable for the present analyses for describing the mean effect only, as in large sample size settings like this study, linear regression models have been found to be robust to violations of the normality assumption (Lumley, Diehr, Emerson, & Chen, 2002; Schmidt & Finan, 2018). Results are presented as the regression coefficients ( $\beta$ ) with corresponding 95% confidence intervals (CIs). Effect modification by sex, age, year, and industry sector (at year  $x-1$ ) was accounted for by adding interaction terms in the weighted linear regression models. Differences with  $p$ -values  $<0.05$  were considered to be statistically significant. All analyses were performed in R 3.4.1 using the package MatchIt (Ho, Imai, King, & Stuart, 2011).

## 3 | RESULTS

### 3.1 | The stratification process

Stratification was done for each year (between 2010 and 2015) separately, so individuals might appear more than once over the course of our yearly analyses. This means that the number of observations exceeds the number of individuals, as an individual might be an employee in year  $x$  and self-employed in year  $x + 1$ . For each year separately however, the individuals and their employment status in that year (self-employed or employees) are unique. Self-employed and employees could only appear in one stratum if they had overlap in their covariate distribution. Overall, only 1% of the self-employed and 20% of the employees had a covariate distribution that was unique and hence could not be matched. Taken over the whole period 2010–2015, the number of unique individuals in our study was 5,741,457 ( $n = 899,015$  with 1 observation (obs);  $n = 767,975$  with 2 obs;  $n = 739,910$  with 3 obs;  $n = 739,161$  with 4 obs;  $n = 732,722$  with 5 obs; and  $n = 1,862,674$  with 6 obs) between. For each year, the number of strata containing matched individuals was around 5000 (Appendix 1).

### 3.2 | Characteristics of study population

Detailed characteristics of the study population are shown in Table 1. After stratification, the distribution according to potentially confounding characteristics did not differ between newly self-employed and employees. Overall, a majority (59%) were men and the mean age was 39.5 (SD 9.8) years. Around 0.5% (121,535 observations) were newly self-employed between 2010 and 2015. Two-fifths (41%) of all observations consisted of a breadwinner with partner, 48% had an income between the second and the fourth quintile, 54% lived in the West region of the Netherlands and a plurality

TABLE 1 Characteristics of self-employed and employees between 2010 and 2015 before and after stratification

	Before stratification			After stratification		
	Total study population (28,022,445 obs) <sup>c</sup>	Self-employed (143,360 obs)	Employees (27,879,085 obs)	Total study population (22,450,993 obs)	Self-employed (121,535 obs)	Employees (22,329,458 obs)
Sex <sup>a</sup> (men)	51.8 (14,506,403)	57.0 (81,709)	51.7 (14,424,694)	58.8 (13,209,881)	58.8 (71,478)	58.8 (13,138,403)
Age, mean (SD)	43.1 (10.5)	39.8 (9.9)	43.3 (10.5)	39.5 (9.8)	39.5 (9.8)	39.5 (9.8)
Age <sup>a</sup>						
25–30 years	15.2 (4,246,898)	21.7 (31,122)	15.1 (4,215,776)	22.0 (4,933,763)	22.0 (26,769)	22.0 (4,906,994)
30–35 years	13.1 (3,670,964)	17.5 (25,030)	13.1 (3,645,934)	17.8 (3,985,429)	17.8 (21,580)	17.8 (3,963,848)
35–40 years	13.7 (3,846,694)	17.0 (24,346)	13.7 (3,822,348)	17.2 (3,870,184)	17.2 (20,886)	17.2 (3,849,298)
40–45 years	15.1 (4,226,217)	15.5 (22,185)	15.1 (4,204,032)	15.7 (3,521,203)	15.7 (19,036)	15.7 (3,502,167)
45–50 years	14.7 (4,131,277)	11.8 (16,907)	14.8 (4,114,370)	11.7 (2,637,150)	11.7 (14,269)	11.7 (2,622,881)
50–55 years	13.4 (3,745,598)	8.6 (12,296)	13.4 (3,733,302)	8.3 (1,856,952)	8.3 (10,072)	8.3 (1,846,880)
55–60 years	10.8 (3,032,529)	5.4 (7813)	10.8 (3,024,716)	5.0 (1,126,630)	5.0 (6106)	5.0 (1,120,524)
60–65 years	4.0 (1,122,268)	2.6 (3661)	4.0 (1,118,607)	2.3 (519,683)	2.3 (2817)	2.3 (516,866)
Position in household <sup>a</sup>						
Breadwinner	20.8 (5,836,530)	19.0 (27,194)	20.8 (5,809,336)	18.8 (4,219,426)	18.8 (22,841)	18.8 (4,196,585)
Breadwinner, with partner	41.3 (11,569,331)	38.2 (54,740)	41.3 (11,514,591)	41.0 (9,199,303)	40.9 (49,655)	41.0 (9,149,648)
Married partner	25.0 (7,019,242)	26.0 (37,281)	25.0 (6,981,961)	24.1 (5,420,829)	24.2 (29,386)	24.1 (5,391,443)
Unmarried partner	8.7 (2,451,518)	10.7 (15,312)	8.7 (2,436,206)	10.3 (2,319,444)	10.4 (12,626)	10.3 (2,306,818)
Child >18 years	3.4 (963,225)	5.0 (7176)	3.4 (956,049)	4.7 (1,066,101)	4.8 (5799)	4.7 (1,060,302)
Other	0.7 (182,599)	1.2 (1657)	0.6 (180,942)	1.0 (225,890)	1.0 (1228)	1.0 (224,662)
Personal income, mean (SD)	68.3 (22.3)	49.8 (33.1)	68.4 (22.2)	53.9 (31.2)	52.6 (32.8)	53.9 (31.2)
Personal income in quintiles <sup>a</sup>						
0%–20%	3.8 (1,058,632)	27.2 (38,923)	3.7 (1,019,709)	23.9 (5,373,140)	23.9 (29,094)	23.9 (5,344,046)
20%–40%	8.7 (2,424,610)	15.5 (22,194)	8.6 (2,402,416)	15.1 (3,383,560)	15.1 (18,324)	15.1 (3,365,236)
40%–60%	19.6 (5,484,249)	14.8 (21,284)	19.6 (5,462,965)	14.8 (3,318,442)	14.8 (17,954)	14.8 (3,300,488)
60%–80%	32.7 (9,166,010)	17.0 (24,367)	32.8 (9,141,643)	18.2 (4,095,837)	18.2 (22,171)	18.2 (4,073,666)
80%–100%	35.3 (9,888,944)	25.5 (36,592)	35.3 (9,852,352)	28.0 (6,280,015)	28.0 (33,992)	28.0 (6,246,023)
Region <sup>a</sup>						
North	10.0 (2,796,208)	9.2 (13,216)	10.0 (2,782,992)	8.8 (1,983,405)	8.8 (10,717)	8.8 (1,972,688)
East	21.4 (5,993,792)	19.2 (27,541)	21.4 (5,966,251)	19.2 (4,304,814)	19.2 (23,296)	19.2 (4,281,518)
West	47.6 (13,347,734)	53.3 (76,400)	47.6 (13,271,334)	54.0 (12,114,948)	54.0 (65,612)	54.0 (12,049,336)
South	21.0 (5,884,711)	18.3 (26,203)	21.0 (5,858,508)	18.0 (4,047,826)	18.0 (21,910)	18.0 (4,025,916)
Industry sector <sup>b</sup>						
Agriculture, forestry, and fishing	0.9 (245,314)	1.8 (2519)	0.9 (242,795)	2.0 (443,311)	2.0 (2399)	2.0 (440,912)

(Continues)

TABLE 1 (Continued)

	Before stratification			After stratification		
	Total study population (28,022,445 obs) <sup>c</sup>	Self-employed (143,360 obs)	Employees (27,879,085 obs)	Total study population (22,450,993 obs)	Self-employed (121,535 obs)	Employees (22,329,458 obs)
Industry and energy	12.9 (3,618,353)	2.4 (3434)	13.0 (3,614,919)	2.8 (628,050)	2.8 (3402)	2.8 (624,648)
Construction	5.0 (1,411,867)	10.2 (14,571)	5.0 (1,397,296)	11.8 (2,650,984)	11.8 (14,383)	11.8 (2,636,601)
Trade, transport, hotels, and catering	21.9 (6,143,013)	13.7 (19,686)	22.0 (6,123,327)	16.2 (3,641,707)	16.2 (19,680)	16.2 (3,622,027)
Information and communication	3.3 (915,096)	4.0 (5,767)	3.3 (909,329)	4.6 (1,039,486)	4.6 (5632)	4.6 (1,033,854)
Financial institutions	4.1 (1,137,019)	7.0 (10,063)	4.0 (1,126,956)	8.2 (1,838,440)	8.2 (9925)	8.2 (1,828,515)
Renting, buying, and selling real estate	0.9 (260,531)	0.8 (1163)	0.9 (259,368)	0.9 (200,097)	0.9 (1077)	0.9 (199,020)
Business services	13.8 (3,867,602)	23.0 (33,007)	13.8 (3,834,595)	27.2 (6,095,494)	27.2 (33,000)	27.2 (6,062,494)
Government and care	33.6 (9,426,586)	15.5 (22,152)	33.7 (9,404,434)	18.2 (4,075,928)	18.2 (22,094)	18.2 (4,053,834)
Culture, recreation, and other services	3.1 (880,433)	7.0 (10,010)	3.1 (870,423)	8.2 (1,837,497)	8.2 (9943)	8.2 (1,827,554)

Abbreviations: obs, observation; SD, standard deviation.

<sup>a</sup>Percentages with (number of observations) are presented.

<sup>b</sup>The category of industry and energy contains mining and quarrying, manufacturing, electricity, and gas's supply, water supply and waste management; trade, transport, hotels, and catering contains wholesale and retail trade, transportation and storage, accommodation, and food serving; business services contains consultancy, research and other specialized business services, renting and leasing of tangible goods and other business support; government and care contains public administration or services, compulsory social security, education, health, and social work activities; culture, recreation, and other services contains culture, sports, and recreation, other service activities, activities of households as employers, undifferentiated goods- and service-producing activities of households for own use or extraterritorial organizations.

<sup>c</sup>The term observations refers to the total number of times individuals were in the dataset, either as an employee or self-employed. This means that the number of observations exceeds the number of individuals as an individual might be an employee in year  $x$  and self-employed in year  $x + 1$ .

worked in the sector of business services (27%), government and care (18%), or trade, transport, hotels, and catering (16%) in the year before they started their business.

### 3.3 | Descriptives of health care expenditure

Table 2 shows the descriptives of health care expenditure in euros for the study population at year  $x-1$ . Expenditures were highest for hospital care and pharmaceutical care, and lowest for allied health care. Women had higher health care expenditures than men. Expenditures for hospital, GP, pharmaceutical, and allied health care, were higher with increasing age, which was not the case for mental health care. Furthermore, health care expenditure was lowest for individuals working in the sector of agriculture, forestry, and fishing and highest for those working in the government and care sectors. Looking at the health care expenditures of self-employed and employees, the descriptive data showed that expenditures for hospital care, GP care, pharmaceutical care, and allied health care were generally lower among newly self-employed as compared to matched employees (ranging from 2 euros for GP care to 155 euros for hospital care). However, expenditure for mental health care was 3 euros higher among self-employed in comparison with matched employees.

TABLE 2 Health care expenditure in euros per capita at year  $x-1$  of new self-employed (SE) and matched employees (E; defined at year  $x$ ), according to sex, age, and sector

	Hospital care		GP care		Mental health care		Pharmaceutical care		Allied health care	
	SE mean (SD) euros	E mean (SD) euros	SE mean (SD) euros	E mean (SD) euros	SE mean (SD) euros	E mean (SD) euros	SE mean (SD) euros	E mean (SD) euros	SE mean (SD) euros	E mean (SD) euros
Total	600.6 (2797.6)	755.28 (3362.47)	27.9 (35.9)	29.9 (37.3)	97.7 (1142.12)	94.7 (1417.6)	135.0 (840.1)	173.4 (1055.1)	9.8 (840.1)	14.1 (127.1)
Sex										
Men, mean (SD)	450.9 (3115.4)	625.3 (3566.5)	20.8 (29.2)	23.2 (31.6)	81.6 (1039.1)	78.5 (1346.0)	119.2 (863.9)	162.6 (1129.0)	7.7 (90.9)	11.1 (113.0)
Women, mean (SD)	814.4 (2250.8)	909.0 (3096.9)	38.0 (41.7)	37.9 (41.6)	120.6 (1274.6)	113.8 (120.6)	157.5 (804.3)	186.1 (960.4)	12.8 (116.5)	17.7 (141.9)
Age										
25–30 years	541.9 (1617.3)	596.3 (2535.5)	24.7 (32.5)	25.4 (32.9)	113.9 (1400.3)	112.0 (1533.5)	87.1 (793.3)	97.4 (750.5)	7.1 (81.9)	8.7 (94.5)
30–35 years	582.5 (1811.3)	707.7 (2807.1)	25.4 (33.4)	27.0 (34.2)	115.7 (1253.0)	114.6 (1458.6)	96.8 (557.2)	124.8 (954.0)	7.4 (98.7)	8.8 (95.4)
35–40 years	597.1 (4930.5)	641.6 (2950.1)	26.9 (35.2)	27.7 (35.1)	92.3 (935.1)	104.2 (1384.7)	124.6 (761.0)	148.6 (1022.9)	7.5 (81.4)	10.6 (107.3)
40–45 years	526.4 (1940.6)	634.6 (3219.1)	27.9 (36.5)	28.7 (36.6)	100.2 (1130.3)	95.9 (1431.5)	144.2 (818.5)	166.4 (1153.3)	9.8 (94.2)	13.0 (121.1)
45–50 years	590.4 (2459.5)	750.6 (3476.3)	30.0 (37.3)	31.1 (38.8)	83.8 (818.8)	90.6 (1457.2)	162.8 (828.8)	196.5 (1198.5)	12.0 (117.6)	16.3 (138.7)
50–55 years	718.3 (2493.6)	906.0 (3887.3)	33.5 (40.3)	34.1 (40.4)	78.5 (902.1)	78.4 (1330.7)	200.2 (1078.1)	229.0 (1127.8)	17.0 (140.4)	20.3 (155.7)
55–60 years	837.6 (3135.6)	1106.9 (4432.0)	35.0 (40.4)	36.9 (41.6)	52.6 (674.3)	63.7 (1304.2)	242.2 (1464.9)	271.1 (1150.2)	17.0 (147.7)	23.3 (167.6)
60–65 years	942.2 (2731.6)	1305.0 (4843.5)	38.5 (43.3)	39.0 (42.7)	65.5 (1788.4)	44.6 (1122.8)	291.8 (938.8)	298.0 (1023.4)	18.4 (124.6)	23.5 (169.3)
Industry sector										
Agriculture, forestry, and fishing	552.6 (2517.6)	537.2 (3668.6)	23.0 (32.2)	22.6 (32.8)	22.2 (256.4)	55.4 (1221.4)	122.8 (930.8)	122.0 (1113.7)	5.8 (57.7)	9.5 (100.3)
Industry and energy	548.1 (1759.7)	708.1 (3612.7)	24.9 (31.5)	26.6 (35.2)	77.8 (986.2)	85.8 (1516.9)	107.0 (695.2)	171.5 (1132.1)	5.1 (65.2)	13.8 (128.1)
Construction	413.6 (1406.81)	633.7 (3259.2)	21.4 (30.9)	23.3 (30.7)	83.9 (1131.7)	54.0 (1077.2)	88.1 (677.0)	136.3 (932.7)	7.8 (91.7)	12.2 (115.9)

(Continues)

TABLE 2 (Continued)

	Hospital care		GP care		Mental health care		Pharmaceutical care		Allied health care	
	SE mean (SD) euros	E mean (SD) euros	SE mean (SD) euros	E mean (SD) euros	SE mean (SD) euros	E mean (SD) euros	SE mean (SD) euros	E mean (SD) euros	SE mean (SD) euros	E mean (SD) euros
Trade, transport, hotels, and catering	647.7 (2283.9)	713.7 (3252.5)	29.7 (37.3)	28.8 (36.5)	85.4 (993.4)	79.1 (1368.3)	140.0 (789.5)	166.4 (1040.3)	9.8 (98.8)	12.5 (118.3)
Information and communication	447.9 (2220.5)	529.8 (3350.4)	20.8 (29.4)	21.1 (29.0)	87.0 (672.5)	83.6 (1043.9)	115.0 (641.8)	140.2 (1320.7)	6.7 (79.5)	9.4 (105.5)
Financial institutions	518.2 (1929.03)	669.5 (3773.0)	22.7 (29.5)	25.9 (32.7)	41.0 (427.5)	81.2 (1180.3)	130.9 (652.0)	161.8 (1079.5)	12.0 (128.7)	12.8 (120.9)
Renting, buying, and selling real estate	592.9 (1877.41)	715.4 (5118.0)	27.1 (35.7)	27.2 (33.4)	64.8 (472.2)	63.8 (868.8)	139.4 (680.7)	169.2 (1150.2)	12.8 (162.4)	14.1 (125.7)
Business services	575.7 (3021.15)	655.1 (3168.0)	26.1 (33.1)	28.2 (36.6)	108.5 (1235.6)	93.4 (1346.5)	130.5 (1037.3)	154.7 (955.3)	9.2 (98.2)	10.9 (109.1)
Government and care	767.2 (4167.86)	888.4 (3397.9)	35.4 (42.7)	34.5 (39.9)	122.1 (1120.6)	116.3 (1547.2)	174.8 (809.3)	196.8 (1071.9)	12.5 (114.1)	17.6 (142.6)
Culture, recreation, and other services	689.9 (1991.24)	767.3 (2977.3)	34.5 (39.1)	32.9 (39.2)	143.1 (1860.5)	109.0 (1433.5)	146.9 (783.0)	176.8 (1029.2)	10.5 (100.8)	14.7 (132.3)

Abbreviations: GP, general practice; SD, standard deviation.



**TABLE 3** Weighted estimates (95% confidence intervals) to compare health care expenditure in euros (at year  $x-1$ ) between new self-employed and matched employees (reference group; defined at year  $x$ ), according to sex, age, and sector

Expenditure of:	Hospital care	GP care	Mental health care	Pharmaceutical care	Allied health care
Total	-73.0 (-91.2 to -54.8)*	-0.5 (-0.7 to -0.3)*	-13.5 (-22.7 to -4.4)*	-23.8 (-29.7 to -18.0)*	-2.2 (-2.9 to -1.5)*
Sex					
Men	-76.3 (-100.1 to -52.6)*	-0.2 (-0.5 to 0.04)	-22.0 (-33.9 to -10.0)*	-26.5 (-34.1 to -18.8)*	-2.1 (-3.0 to -1.2)*
Women	-68.5 (-96.9 to -40.1)*	-0.9 (-1.2 to -0.6)*	-1.5 (-15.8 to 12.8)	-20.1 (-29.2 to -11.0)*	-2.3 (-3.4 to -1.2)*
p for interaction	0.68	0.002	0.03	0.29	0.78
Age					
25-30 years	-13.1 (-51.9 to 25.7)	0.7 (0.2 to 1.1)*	-11.9 (-31.4 to 7.7)	-3.5 (-15.9 to 9.0)	-0.1 (-1.5 to 1.4)
30-35 years	-31.7 (-75.0 to 11.5)	-0.5 (-1.0 to -0.03)*	-14.1 (-35.8 to 7.7)	-24.7 (-38.6 to -10.9)*	-0.4 (-2.0 to 1.2)
35-40 years	-5.1 (-49.0 to 38.9)	-0.5 (-1.0 to 0.04)	-21.4 (-43.5 to 0.7)	-25.4 (-39.5 to -11.3)*	-3.9 (-5.6 to -2.3)*
40-45 years	-97.5 (-143.6 to -51.5)*	-0.6 (-1.2 to -0.1)*	-5.3 (-28.4 to 17.9)	-30.1 (-44.8 to -15.3)*	-2.6 (-4.3 to -0.9)*
45-50 years	-139.3 (-192.5 to -86.1)*	-1.2 (-1.8 to -0.6)*	-24.8 (-51.5 to 1.9)	-42.0 (-59.1 to -25.0)*	-3.5 (-5.5 to -1.6)*
50-55 years	-165.1 (-228.4 to -101.8)*	-1.0 (-1.7 to -0.2)*	-6.5 (-38.4 to 25.3)	-33.9 (-54.2 to -13.6)*	-1.8 (-4.2 to 0.6)
55-60 years	-237.6 (-318.9 to -156.3)*	-2.3 (-3.3 to -1.4)*	-17.3 (-58.1 to 23.6)	-28.1 (-54.1 to -2.0)*	-6.0 (-9.0 to -2.9)*
60-65 years	-276.6 (-396.2 to -156.9)*	-1.1 (-2.5 to 0.3)	-17.5 (-42.6 to 77.7)	-18.6 (-57.0 to 19.7)	-6.3 (-10.7 to -1.8)*
p for interaction	<0.001	<0.001	0.89	0.02	<0.001
Industry sector					
Agriculture, forestry, and fishing	2.9 (-126.9 to 132.7)	0.05 (-1.4 to 1.5)	-60.3 (-125.5 to 5.0)	7.4 (-34.2 to 49.0)	-2.2 (-7.0 to 2.7)
Industry and energy	-168.2 (-277.2 to -59.2)*	-4.9 (-6.1 to -3.6)*	-119.4 (-174.1 to -64.6)*	-102.6 (-137.6 to -67.7)*	-11.7 (-15.8 to -7.7)*
Construction	-133.4 (-186.4 to -80.4)*	0.2 (-0.5 to 0.8)	-13.0 (-39.6 to 13.7)	-22.5 (-39.5 to -5.5)*	-4.7 (-6.6 to -2.7)*
Trade, transport, hotels, and catering	0.5 (-44.8 to 45.8)	1.5 (1.0 to 2.0)*	-19.9 (-42.7 to 2.8)	-20.8 (-35.3 to -6.3)*	-0.2 (-1.9 to 1.5)
Information and communication	-59.9 (-144.6 to 24.8)	-0.6 (-1.5 to 0.4)	-24.2 (-66.7 to 18.4)	-24.8 (-52.0 to 2.4)	-3.3 (-6.5 to -0.2)*
Financial institutions	-131.7 (-195.5 to -67.9)*	-1.5 (-2.2 to -0.8)*	-48.4 (-80.5 to -16.3)*	-37.6 (-58.0 to -17.1)*	-1.3 (-3.7 to 1.1)
Renting, buying, and selling real estate	-104.1 (-297.8 to 89.6)	-1.6 (-3.9 to 0.6)	-19.8 (-117.1 to 77.5)	-40.3 (-102.4 to 21.8)	-3.5 (-10.7 to 3.7)
Business services	-52.2 (-87.2 to -17.2)*	-0.9 (-1.3 to -0.5)*	11.8 (-5.8 to 29.4)	-22.5 (-33.7 to -11.3)*	-0.5 (-1.9 to 0.8)
Government and care	-109.8 (-152.5 to -67.0)*	-1.7 (-2.2 to -1.2)*	-21.0 (-42.5 to 0.48)	-15.1 (-28.9 to -1.4)*	-3.6 (-5.2 to -2.1)*
Culture, recreation, and other services	-49.7 (-113.4 to 14.1)	1.0 (0.3 to 1.8)*	20.0 (-12.1 to 52.0)	-19.9 (-40.3 to 0.6)	-1.4 (-3.8 to 1.0)
p for interaction	0.001	<0.001	<0.001	0.002	<0.001

Abbreviation: GP, general practice.

\*  $p \leq 0.01$ .

### 3.4 | Weighted analyses comparing health care expenditure between self-employed and employees

The interactions between sex, age, and industry sector were statistically significant (all  $p \leq 0.05$ ). As only a limited number of studies are available on differences in overall health care expenditure between newly self-employed and employees, we present both analyses of the whole group and stratified analyses according to sex, age, year, and sector for all outcomes (Table 3). In the overall analyses using weighted linear regression, expenditures for all five types of health care at year  $x-1$  were significantly lower among self-employed than among employees (defined at year  $x$ ), with the highest estimates found for mental health care (13.5 euros), pharmaceutical care (23.8 euros), and hospital care (73 euros). Stratified analyses by sex showed that expenditure for mental health care was significantly lower in self-employed men (22 euros) compared to male employees. For women no differences between self-employed and employees were found. Furthermore, analyses stratified by age showed that above the age of 40 years, self-employed individuals had a significantly lower hospital care expenditure than employees in the same age group, and differences became greater with increasing age. Until the age of 40 years, no differences in hospital care expenditure between self-employed and employees were found. In addition, GP care expenditure was slightly, but statistically significantly, higher among 25–30 years old self-employed, and slightly lower among older self-employed. No clear pattern in differences between age groups for the other health care expenditures were found. Finally, stratified analyses by industry sector showed that, compared to employees, self-employed individuals working in the industry and energy sector, financial institutions, government and care, construction, or business services had a significantly lower health care expenditure at year  $x-1$ . Differences were most pronounced for hospital care, with the largest difference being found between self-employed working in the industry and energy sector and matched employees (–168 euros). Self-employed working in the industry and energy sector also had a significantly lower expenditure for mental health care (120 euros) and pharmaceutical care (102 euros) in comparison with matched employees. Furthermore, self-employed individuals working in the sectors of trade, transport, hotels, and catering and culture, recreation, and other services were found to have a slightly, but statistically significantly, higher GP care expenditure. No clear patterns for the other sectors were found.

## 4 | DISCUSSION

In this study, we found that in comparison with employees, expenditures for hospital care, pharmaceutical care, mental health care, and to a much lesser extent allied health care and GP care, were lower among self-employed in the year before they started their business. Differences in health care expenditure between newly self-employed and employees were most pronounced in men (for mental health care), individuals aged 40 years and older (for hospital care), and those working in the industry and energy sector (for hospital care, mental health care, and pharmaceutical care), construction, financial institutions, or government and care (for hospital care), with self-employed spending significantly less on health care than employees in the year before they started their business. These findings suggest that the healthy are more likely to choose self-employment, but this differs depending on sex, age, and industry sector.

Our finding that healthier individuals are more likely to become self-employed concurs with previous findings of two observational longitudinal studies from the US and Portugal (Goncalves & Martins, 2018; Rietveld et al., 2015). However, the Portuguese study found this selection effect to be stronger among women, and found no differences between individuals under and above the age of 45 years (Goncalves & Martins, 2018). This is not in keeping with the results of our study, which show that the selection effect is most pronounced in men, individuals aged 40 years and older, and those working in the sectors of industry and energy, construction, financial institutions, and government and care. Differences may be due to study population and type of health measures used. Although of similar age, our study population consisted of a larger proportion of men (59% vs. 47%) than the previous study. Furthermore, the authors of the previous study used registered hospital admissions, whereas our study compared health care expenditures between self-employed and employees. Based on the generally lower health care expenditure among self-employed in the industry and energy, construction, financial institutions, and government and care sectors, this might indicate that a selection effect is particularly in force in those working in physically demanding and high stress jobs (CBS, 2018). However, given that we did not have data available on types of jobs the individuals in our study were working in, we do not know this with certainty. Furthermore, some individuals may be pushed into self-employment, perhaps due to

health difficulties as they may experience greater difficulties in finding a salaried job (Zissimopoulos & Karoly, 2007). A previous study using Dutch data from 2017 indicated the percentage of self-employed that had negative reasons to do so was less than 10%, which suggests the majority had chosen this path voluntary (out of free will; CBS, 2017, 2019a, 2019b, 2019c, 2019d). Further research is warranted to study whether these numbers differ by industry sector and whether self-selection is dependent on whether self-employment is voluntary or not. Also, differences in expenditure for GP care between self-employed and matched employees were found to be relatively small, and in some cases estimates were even positive. Our findings therefore suggest that younger self-employed and those working in the sectors of trade, transport, and hotels and catering and culture, recreation, and other services had a slightly, but statistically significantly, higher GP care expenditure. We do not have a clear explanation for these findings. Interpretation is further complicated by the fact that GP care expenditure only partly reflects actual visits to the GP, while also including other costs related to total GP care (Oostenbrink & Rutten, 2005). We also found that hospital care expenditure was lower in younger self-employed individuals in comparison with employees. This might suggest that older individuals who are less healthy may not even try to become self-employed or are faced with more obstacles, such as in the process of securing loans, when they want to start a business (Gielnik et al., 2012). Qualitative studies with more detailed data on these issues are needed to investigate the reasons why certain subgroups and sectors are more likely to choose self-employment.

To our knowledge, this is the first study to examine whether self-employed individuals have lower health care expenditures in the year before they started their business than employees. The study population was large and based on the total labor force in the Netherlands. The availability of data on health care expenditure of recently self-employed allowed us to study whether healthier individuals are more likely to become self-employed. Previous studies on this topic relied on outcome data from self-employed after—rather than before—they started their business. Another strength is that unlike previous studies on this topic, we were able to match employees so that self-employed were compared with employees with similar characteristics. We thereby used all available individuals in the data set, so as to effectively reduce bias due to observed confounding variables (Stuart & Green, 2008). Our study also benefitted from the use of linkage with register data to objectively obtain data on health care expenditure. Furthermore, the availability of data on which sector individuals were working in allowed us to test for interactions involving that variable. This study also has some limitations. First, newly self-employed workers were defined as individuals with income from self-employment as their main annual source of revenue. Therefore, self-employed individuals could, in theory, have worked as an employee in that same year as well, and vice versa. Although numbers from 2019 indicate that the great majority of self-employed workers (94%) or paid employees (98%) do not hold a duo job as employee and self-employed respectively (CBS, 2019a, 2019b, 2019c, 2019d), our findings may have underestimated this. Second, differences between health care expenditure between self-employed and employees varied for different types of health care. Unfortunately, we did not have further details on the underlying symptoms or diagnoses associated with health care expenditure. Further research is needed to further disentangle what kind of symptoms or diseases play a role in the selection into self-employment. A third limitation is that we only had data available on health care expenditure. Although previous studies suggest a close relation with health status, so that individuals with a higher health care expenditure are likely to be less healthy than those with a low expenditure, others suggest this relation to be less clear (Rivera & Currais, 1999). While studies using other health-related outcomes observed similar results (Goncalves & Martins, 2018; Rietveld et al., 2015), replication of our study using registry-derived longitudinal data on other health outcomes than health care expenditure would strengthen our findings. Furthermore, future research might investigate whether the choice for self-employment plays out differently at different parts of the expenditure distribution. Finally, we did not focus on studying contextual effects, as this would require substantially different types of analyses, which was not the scope of this paper. Therefore, we cannot conclude anything on potential health consequences of self-employment. As this is important for the interpretation of our results, this issue warrants further investigation.

In summary, findings of this study showed that in comparison with employees, expenditures for hospital care, pharmaceutical care, mental health care, and to a lesser extent allied health care and GP care, were lower among self-employed in the year before they started their business. In line with previous studies, these findings suggest a positive selection of the healthy into self-employment. This holds true, in particular, for men, individuals aged 40 years and older, and those working in the industry and energy sector, construction, financial institutions, government, and care. Qualitative research is needed to investigate the reasons for why these subgroups are more likely to choose self-employment. This is important given the large rise in the number of self-employed individuals working in the Netherlands, as in many other Western countries, which makes it a relevant topic for policymakers.

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## CONFLICT OF INTEREST

None of the authors declared a conflict of interest.

## AUTHOR CONTRIBUTIONS

Ellen Uiters designed research; Gerrie-Cor Herber and Maarten Schipper performed statistical analyses; Gerrie-Cor Herber and Ellen Uiters wrote the paper; Gerrie-Cor Herber and Ellen Uiters were responsible for the manuscript's contents; Gerrie-Cor Herber, Maarten Schipper, Marc Koopmanschap, Karin Proper, Johan Polder, and Ellen Uiters were involved in the interpretation of the data; Marc Koopmanschap, Karin Proper, Fons van der Lucht, Hendriek Boshuizen, and Johan Polder critically reviewed the manuscript; all authors approved the final version and agree both to be personally accountable for their own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

## ETHICAL APPROVAL

According to Dutch law (Wet medisch wetenschappelijk onderzoek met mensen), formal approval (e.g., from a medical ethics committee), and consent to participate was not required as this study relied on secondary anonymized data collection in the context of performing statutory tasks.

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APPENDIX 1 Results of the exact matching procedure

Year	Number of strata of matched observations	Employee/ Self-employed	Included <i>N</i> (%)	Excluded <i>N</i> (%)
2010	4620	Self-employed	18,896 (99.1)	176 (0.9)
		Employees	3,583,008 (75.6)	1,155,888 (24.4)
2011	5086	Self-employed	20,899 (99.3)	147 (0.7)
		Employees	3,841,694 (82.4)	818,660 (17.6)
2012	4885	Self-employed	19,011 (99.4)	121 (0.6)
		Employees	3,779,478 (81.4)	863,299 (18.6)
2013	4964	Self-employed	20,206 (99.4)	114 (0.6)
		Employees	3,757,820 (81.6)	844,693 (18.4)
2014	4965	Self-employed	20,772 (99.4)	135 (0.6)
		Employees	3,659,121 (80.2)	902,040 (19.8)
2015	5155	Self-employed	21,751 (99.3)	144 (0.7)
		Employees	3,708,337 (81)	869,404 (19)