



# JOB FLOWS IN GREECE DURING THE RECENT YEARS

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## ABSTRACT

In this paper we study job flows in Greece using detailed data on private sector dependent employment for 2015-2017, a period characterised by brisk employment growth. We find that during the years reviewed by our study there is a significant amount of job creation and job destruction going on at the same time. Moreover, job reallocation increases with firm size, which is at odds with findings for other countries. In terms of employee age categories, job creation is the strongest for those over 44 years old. Our regression results imply that, at the sectoral level, job creation is negatively correlated with wage growth and positively correlated with capital intensity and net firm growth. By contrast, job destruction at the sectoral level is negatively correlated with net firm growth and positively correlated with export intensity, which may reflect a creative destruction process as the Greek economy is becoming more open.

**Keywords:** job reallocation, sectoral analysis, employment developments

**JEL classification:** J23, J63

## ΡΟΕΣ ΑΠΑΣΧΟΛΗΣΗΣ ΣΤΗΝ ΕΛΛΑΔΑ ΚΑΤΑ ΤΗΝ ΠΡΟΣΦΑΤΗ ΠΕΡΙΟΔΟ

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## ΠΕΡΙΛΗΨΗ

Στο παρόν άρθρο εξετάζουμε τις ροές απασχόλησης στην Ελλάδα χρησιμοποιώντας λεπτομερή στοιχεία για τη μισθωτή απασχόληση στον ιδιωτικό τομέα την περίοδο 2015-2017, η οποία χαρακτηρίζεται από σημαντική αύξηση της απασχόλησης. Βρίσκουμε ότι κατά τα έτη της ανάλυσης μας υπάρχει ταυτόχρονα σημαντική δημιουργία και καταστροφή θέσεων εργασίας. Επιπλέον,

η ανακατανομή των θέσεων εργασίας είναι μεγαλύτερη όσο αυξάνει το μέγεθος των επιχειρήσεων, γεγονός που δεν συμβαδίζει με τα ευρήματα μελετών σε άλλες χώρες. Ως προς τις ηλικιακές κατηγορίες των εργαζομένων, η πιο ισχυρή δημιουργία νέων θέσεων εργασίας αφορά τους εργαζομένους ηλικίας άνω των 44 ετών. Τα αποτελέσματα της οικονομετρικής μας ανάλυσης υποδηλώνουν ότι, σε επίπεδο κλάδου οικονομικής δραστηριότητας, η δημιουργία νέων θέσεων εργασίας συσχετίζεται αρνητικά με το ρυθμό μεταβολής των μισθών και θετικά με την ένταση κεφαλαίου και τη μεταβολή του αριθμού των επιχειρήσεων του κλάδου. Σε αντίθεση, η καταστροφή θέσεων εργασίας σε επίπεδο κλάδου οικονομικής δραστηριότητας συσχετίζεται αρνητικά με τη μεταβολή του αριθμού των επιχειρήσεων και θετικά με το βαθμό εξωστρέφειας του κλάδου, γεγονός που ενδεχομένως αντανάκλα μια διαδικασία δημιουργικής καταστροφής καθώς η ελληνική οικονομία γίνεται πιο εξωστρεφής.

# JOB FLOWS IN GREECE DURING THE RECENT YEARS<sup>1</sup>

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## I INTRODUCTION

Following the seminal work of Davis and Haltiwanger (1992), plenty of evidence has accumulated showing that there is significant job reallocation in all countries and sectors irrespective of the phase of the cycle (see e.g. Gómez-Salvador et al. 2004, Pisu 2008, Heuse and Saks 2009, and Haltiwanger et al. 2014). In particular, it has been shown that many jobs are simultaneously created and destroyed even when employment growth is zero. The extent of job creation and destruction has been found to depend on a number of characteristics, such as the size and age of firms, the sector of activity, labour market institutions and firms' engagement in international markets (see e.g. Gómez-Salvador et al. 2004, Pisu 2008 and references therein).

In Greece, following a deep recession that resulted in the loss of more than one quarter of its real output in the period 2009-2015, employment has started to increase at a brisk pace well ahead of the recovery of real activity. For instance, according to administrative data, the number of private sector employees grew on average by 6.7% annually in the period January 2014-November 2018.<sup>2</sup>

This robust employment growth in an economy that is gradually recovering from a severe recession warrants some further analysis in the context of the above mentioned literature. In particular, in this recovery process, it would be interesting to analyse the drivers of employment growth, gauge the extent of job creation and job destruction that underlie these

employment developments and uncover any potential heterogeneities in the response of sectors and firms of different size.

For the purpose of our analysis we use detailed employment data for 2015-2017, disaggregated at the level of sector, firm size and employee age. The data are from the ERGANI database – an administrative data source – compiled by the Ministry of Labour, Social Security and Social Solidarity.

We find that during the years reviewed by our study there is a significant amount of job creation and job destruction going on at the same time. Moreover, job reallocation increases with firm size, which is at odds with findings for other countries. In terms of employee age categories, job creation is the strongest for those over 44 years old. Finally, our regression results imply that, at the sectoral level, job creation is negatively correlated with wage growth and positively correlated with capital intensity and net firm growth. By contrast, job destruction at the sectoral level is negatively correlated with net firm growth and positively correlated with export intensity, which may reflect a creative destruction process as the Greek economy is becoming more open.

1 We would like to thank the Ministry of Labour, Social Security and Social Solidarity for providing detailed employment micro-aggregated data from the ERGANI database, as well as Heather Gibson and Georgia Pavlou for sharing their data on sectoral characteristics. We would also like to thank Hiona Balfoussia and seminar participants at the Bank of Greece for their constructive comments. The views expressed in this paper are those of the authors and do not necessarily reflect those of the Bank of Greece.

2 Source: Monthly reports on employment, Social Security Institute (IKA/EFKA). This data source is comparable to the ERGANI database used in our analysis. They both refer to administrative data.

The remainder of the article is structured as follows. Section 2 provides a short literature review. In Section 3 we provide a brief description of the data used as the basis for our analysis. Section 4 describes the concepts of gross job flows and the methodology used to define them, while Section 5 presents and discusses the paper's findings. The final section concludes.

## 2 LITERATURE REVIEW

A well-established fact in the literature is that many jobs are simultaneously created and destroyed. As detailed microeconomic data have become available in more recent years, there is ample empirical evidence shedding light on the various aspects and determinants of job creation and destruction.

In their seminal work, Davis and Haltiwanger (1992) document extensive job creation and job destruction rates within narrowly defined sectors, using US manufacturing establishment-level data. Moreover, they show that job reallocation is mainly driven by establishment-level employment dynamics, rather than between-sector employment shifts, which points to the high relevance of plant-level heterogeneity in shaping labour demand. Indeed, they find that differences in the intensity of job reallocation across establishments strongly relate to observable firm characteristics, such as age and size.

The main insights from the work of Davis and Haltiwanger (1992) were confirmed by later country-specific studies, including Konings (1995) for the United Kingdom, Abowd et al. (1999) for France and more recently Heuse and Saks (2009) for Belgium, as they all find considerable job reallocation at the establishment level. Moreover, the heterogeneity across firm job reallocation dynamics is partly accounted for by observable firm and worker characteristics, such as the sector and region of activity, firm size, type of employment contract (fixed-term or open-ended) and the distinction

between blue- and white-collar workers. A further common finding among these studies is that job creation and job destruction strongly differ across firm size, being higher in smaller firms. They also tend to be higher in services, rather than in manufacturing firms. Lastly, most of the reallocation of jobs is accounted for by continuing firms, rather than firm churning.

This stream of literature has also examined the extent to which excess job reallocation is driven by participation in international trade, as predicted by trade models with firm heterogeneity, in the spirit of Melitz (2003). Early empirical studies including Davis et al. (1996) and Levinsohn (1999) showed the relevance of trade-induced job reallocation by exploiting differences in trade intensity across industries. Later studies exploited further the variation in export intensity at the firm level. For a sample of Belgian manufacturing firms, Pisu (2008) finds that up to 30% of total job reallocation is driven by the shifts of jobs from firms that do not export to those that export.

Moving to cross-country studies allows to investigate the role of institutional factors in shaping the magnitude of gross job flows. OECD (2009 and 2010) uses harmonised measures of job and worker flows for OECD economies to show that labour market institutions affect gross job flows. Specifically, lax dismissal regulations and low firing and hiring costs are associated with higher job reallocation.<sup>3</sup> These conclusions were further supported by the works of Gómez-Salvador et al. (2004) for European firms and Haltiwanger et al. (2014) for a sample including also emerging countries.

## 3 DESCRIPTION OF THE DATASET

Our analysis of gross job flows and employment growth is based on administrative data, for three years (2015-2017), on the number of

<sup>3</sup> The variation in employment protection legislation explains up to 30% of cross-country variation in gross job flows (OECD 2010).

employees at the level of the 2-digit NACE sectors, at the end of October of each year, from the annual accounts of the ERGANI database. The ERGANI database covers the whole population of private sector employees and includes information on firm characteristics, such as the number of employees and the sector of activity, as well as on employee characteristics, such as age, gender and type of contract.<sup>4</sup> This database includes the information submitted annually by all private sector employers and serves as a detailed registry of the employment history of all private sector employees. The information collected is at the job/worker level starting in 2014. However, due to the recent inception of the database and the sensitivity of the data contained therein, only micro-aggregated data are currently available for research purposes.

The data used in this paper is at the following level of disaggregation: number of employees in sector  $s$ , working in firms of size  $i$  and belonging to the age category  $j$ . Specifically, the above information is available for 87 2-digit NACE sectors, 3 age categories (<25, 25-44, >44) and 4 firm size classes (1-10, 11-50, 51-250 and 250+).

For instance, one observation refers to the number of employees aged between 25 and 44, working in 2015 in firms of 1-10 employees in the manufacture of tobacco products (2-digit NACE sector 12). For each 2-digit NACE sector we have roughly 12 such observations per year on the number of employees at the end of October. These give us approximately 955 employment cells per year and 2,863 observations in total.

#### 4 DESCRIPTION OF THE METHODOLOGY

In order to look deeper into the determinants of and the contributors to employment growth in Greece during the recent years, we compute job creation and job destruction rates by adopting the methodology proposed by Davis and Haltiwanger (1992) and Davis et al. (1996).

Conceptually, job creation rates refer to an appropriately weighted sum of positive employment growth rates among the various units of observation. Similarly, job destruction rates refer to the respective sum of negative growth rates.

Let the level of employment at each cell  $n$  (i.e. employment of each sector/size/age category) be defined as  $x_{nt}$  and the employment growth rate of each cell between period  $t$  and  $t-1$  as  $g_{nt} = \frac{x_{nt} - x_{n,t-1}}{x_{n,t-1}}$ . Let us also denote total employment as  $X_{t-1} = \sum_n x_{n,t-1}$  and the weight of each cell in total employment as  $\frac{x_{n,t-1}}{X_{t-1}}$  in period  $t-1$ . Job creation  $JC_t$  and job destruction  $JD_t$  rates can thus be expressed as:

$$JC_t = \sum_n g_{nt} \frac{x_{n,t-1}}{X_{t-1}}, \text{ for } g_{nt} > 0 \quad (1)$$

$$JD_t = \sum_n |g_{nt}| \frac{x_{n,t-1}}{X_{t-1}}, \text{ for } g_{nt} < 0 \quad (2)$$

Therefore, job creation in period  $t$  is the sum of employment gains weighted by the employment share of the relevant cells in total employment in  $t-1$ , while job destruction refers to the sum of employment losses weighted by the employment share of the relevant cells in total employment in  $t-1$ .

Consequently, net employment growth in each period  $t$  is the difference between job creation and job destruction,  $NE_t = JC_t - JD_t$ . Job reallocation  $JR_t$  is defined as the sum of the job creation and the job destruction rates  $JR_t = JC_t + JD_t$  and is a measure of the rate at which the total number of jobs is reallocated in the economy, i.e. a measure of job turnover.

If the focus of the analysis is on the contributors to total economy's employment growth,  $X_{t-1}$  refers to total employment in the economy in period  $t-1$  and  $\frac{x_{n,t-1}}{X_{t-1}}$  to the share of cell  $n$  in the economy's total employment in  $t-1$ . If an analysis at the sectoral level is pursued (within-sector job creation and job destruction),  $X_{t-1}$

<sup>4</sup> Employees working in public sector entities under private-sector contracts are also registered in this database.

**Table 1 Total economy – Net employment growth and components**

Year	Total job creation	Total job destruction	Net employment growth
2016	8.08%	2.21%	5.87%
2017	8.50%	1.06%	7.44%

Source: ERGANI and authors' calculations.

refers to the sector's total employment in period  $t-1$  and  $\frac{X_{n,t-1}}{X_{t-1}}$  to the share of cell  $n$  in the sector's total employment in  $t-1$ .<sup>5</sup>

## 5 RESULTS

In 2016 and 2017, dependent employment in the private sector grew vigorously by 5.9% and 7.4%, respectively. This net employment growth is however the outcome of even stronger job creation as well as significant job destruction. Table 1 shows that the job creation rate stood at 8.1% in 2016 and 8.5% in 2017, while the job destruction rate was 2.2% and 1.1%, respectively.<sup>6</sup> Thus, even in a period characterised by strong employment growth there is a non-negligible magnitude of job destruction. These rates imply that about 10% of all jobs are reallocated across sectors, firm sizes and worker age groups.<sup>7</sup>

These aggregate numbers, however, may mask significant heterogeneity in job creation and destruction across sectors, firm size classes and age categories of the workers. Thus, in order to obtain a clearer picture of the drivers of job creation and job destruction, we exploit each dimension available in our dataset. In this exercise, we look into the contribution of each group to total economy's employment growth as well as the employment growth rates that underlie the groups' contributions.

### 5.1 DESCRIPTIVE RESULTS BY FIRM SIZE AND EMPLOYEE AGE CATEGORY

Table 2 presents both the contribution of each of the four firm size classes to net employment

growth in each of the years of our sample as well as the changes within each group.<sup>8</sup> The figures presented in Table 2 should be read as follows: in the third column, the job creation rates of each of the four size categories add up to total economy's job creation rate for 2016, i.e. 8.08%. Similarly, in the fourth column they add up to the economy's job destruction rate for 2016, i.e. 2.21%, and in the fifth column they add up to net employment growth for 2016, i.e. 5.87%. Finally, columns 6-8 present the annual rates of job creation, job destruction and net employment growth within each firm size group.

It appears that, for Greece, job creation rates are fairly equally distributed among small (1-10 employees) and large firms (51-250 and 250+ employees), with job creation rates ranging from 1.7% to 1.9%. Interestingly, medium-sized firms (11-50 employees) that employ a quarter of all employees exhibit the strongest job creation activity, contributing around 2.6 percentage points to the economy-level job creation. At the same time, job destruction rates are monotonically increasing with firm size. This contrasts with a common finding in the literature that job creation and job destruc-

<sup>5</sup> Similarly, if the focus is on job creation and destruction rates within employee age or firm size categories,  $X_{i,t}$  refers to the total employment of the group and  $\frac{X_{n,t-1}}{X_{t-1}}$  to the share of cell  $n$  in the group's total employment in  $t-1$ .

<sup>6</sup> These job creation and job destruction rates are calculated from equations (1) and (2), where  $X_{i,t}$  refers to total employment in the economy in  $t-1$  and  $\frac{X_{n,t-1}}{X_{t-1}}$  to the share of cell  $n$  in the economy's total employment in  $t-1$ .

<sup>7</sup> As mentioned earlier, job reallocation is the sum of job creation and job destruction and refers to the total number of jobs reallocated in the economy or group.

<sup>8</sup> The net employment growth within each group at time  $t$  multiplied by the share of the group in  $(t-1)$  gives us the contribution of the group to total economy's net employment growth. The same holds for job creation and destruction.

**Table 2 Net employment growth developments by firm size class**

Year	Size	Contributions to total economy			Within-group developments		
		Job creation	Job destruction	Net employment growth	Job creation	Job destruction	Net employment growth
2016	1-10	1.89%	0.08%	1.81%	6.18%	0.26%	5.92%
2016	11-50	2.59%	0.19%	2.41%	10.54%	0.76%	9.78%
2016	51-250	1.70%	0.86%	0.84%	9.36%	4.76%	4.61%
2016	250+	1.89%	1.08%	0.82%	7.10%	4.04%	3.06%
<b>2016</b>		<b>8.08%</b>	<b>2.21%</b>	<b>5.87%</b>			
2017	1-10	2.18%	0.11%	2.07%	7.13%	0.36%	6.77%
2017	11-50	2.31%	0.14%	2.17%	9.07%	0.56%	8.51%
2017	51-250	1.78%	0.25%	1.54%	9.93%	1.37%	8.57%
2017	250+	2.22%	0.56%	1.66%	8.58%	2.16%	6.42%
<b>2017</b>		<b>8.50%</b>	<b>1.06%</b>	<b>7.44%</b>			

*Employment shares:* 1-10 (30%), 11-50 (25%), 51-250 (18%), 250+ (27%)

Source: ERGANI and authors' calculations.

tion rates decrease monotonically with firm size.<sup>9</sup> The main idea behind this decreasing relationship is that, as firms become larger and more settled in their specific economic environment, they also learn more about the demand they face, their production capabilities and their optimal employment levels. As such, they exhibit lower rates of job creation and destruction. The different findings for Greece may, however, reflect the sharp decline in economic activity during the crisis years. Indeed, the strong contraction of economic activity and the subsequent upturn have led to a significant increase in uncertainty regarding the demand faced by firms. A further source of increased uncertainty regarding demand conditions and production capabilities may emanate from the structural transformation of an economy that is gradually becoming more open. While the former source of uncertainty would be relevant for all firm sizes, the latter would affect mostly larger firms that are more export-oriented (and have become even more so in recent years). Taken together, these two sources of uncertainty would explain why we observe increasing job reallocation by firm size.

It should be noted that these contributions are driven by significant year-on-year employment dynamics within each of the individual firm size categories both in 2016 and in 2017. Medium-sized firms (11-50 employees) perform remarkably well, with net employment growth rates being around 10% and 8.5% in 2016 and 2017, respectively. At the same time, year-on-year net employment growth within the above firm size categories is the outcome of a significant reallocation of jobs within each firm size category. For instance, in 2017 job reallocation rates within bigger firms – with 51-250 and 250+ employees – stand at around 11% (sum of columns 6 and 7).

Table 3 presents job creation and job destruction in terms of employee age classes in a similar fashion. Employees below the age of 25 account for about 8% of total employees, while the relevant share of employees aged between 25 and 44 is about 60% and the share of those above the age of 44 is around 32%.

<sup>9</sup> See e.g. Haltiwanger and Davis (1992), Gómez-Salvador et al. (2004) and Heuse and Saks (2009).

**Table 3 Net employment growth developments by employee age class**

Year	Age	Contributions to total economy			Within-group developments		
		Job creation	Job destruction	Net employment growth	Job creation	Job destruction	Net employment growth
2016	<25	1.14%	0.16%	0.97%	15.56%	2.24%	13.32%
2016	25-44	3.68%	1.52%	2.16%	5.88%	2.42%	3.45%
2016	44+	3.26%	0.53%	2.73%	10.86%	1.75%	9.10%
<b>2016</b>		<b>8.08%</b>	<b>2.21%</b>	<b>5.87%</b>			
2017	<25	0.98%	0.10%	0.87%	12.49%	1.33%	11.16%
2017	25-44	3.58%	0.73%	2.85%	5.85%	1.19%	4.65%
2017	44+	3.95%	0.22%	3.72%	12.76%	0.72%	12.04%
<b>2017</b>		<b>8.50%</b>	<b>1.06%</b>	<b>7.44%</b>			

*Employment shares:* <25 (8%), 25-44 (60%), 44+ (32%)

Source: ERGANI and authors' calculations.

In terms of net employment growth we can note that for the whole economy the contribution of the age class 44+ is similar, on average, to the contribution of the age class 25-44 (2.2% and 2.7% in 2016 and 2.9% and 3.7% in 2017, respectively).

These sizeable contributions are the outcome of robust year-on-year growth in both these categories. However, the employment growth of the age category 44+ is about three times that of the age category 25-44, i.e. around 9% and 12% in 2016 and 2017, respectively.

For the age category of <25, net employment growth is also robust, standing at about 12%, on average, per year. However, due to its low share in total employment, its contribution is fairly small.

Within-group employment developments imply that job reallocation within age categories has been most dynamic for the young (<25) and the older (44+) workers, with around 16% for the former category and about 13% for the latter group, on average. For both these categories the key driver is job creation. By contrast, job reallocation dynamics are more muted in the age category 25-44. That said, this group features the high-

est job destruction rate in 2016 among all age groups.

The dynamic job creation of the age categories <25 and 44+ may reflect different needs of firms. Specifically, cost considerations may be a key determinant of job creation for young employees, as they could, at the time, be employed at sub-minimum wages. Indeed, the occurrence of sub-minimum wage earners and the number of employed young workers were highly correlated.<sup>10</sup> By contrast, the employment of the 44+ age cohort may indicate that firms tend to also employ workers with more labour market experience, as their human capital may prove to be beneficial to their expansion process. Moreover, as the retirement age in Greece has increased significantly in recent years, older workers choose to remain in the labour force for longer.<sup>11</sup> The increased employment of older workers is also in line with broader developments in the euro area.<sup>12</sup>

Finally, exploiting further the dimensions of our dataset, we go one step further and look at the contribution of worker age classes across all

<sup>10</sup> See Bank of Greece (2018c).

<sup>11</sup> It may also, to some extent, reflect an added worker effect, which has been found to be significant in Greece during the crisis. See Papapetrou and Tsalaporta (2018).

<sup>12</sup> See Bodnár (2018).



**Table 4 Relative importance of age and size contributions to net employment growth in 2017**

(%)

Age \ Size	1-10	11-50	51-250	250+	Sum
<25	4.2	4.2	2.1	1.3	11.7
25-44	<b>10.1</b>	<b>12.6</b>	8.2	7.4	<b>38.3</b>
44+	<b>13.5</b>	<b>12.4</b>	<b>10.4</b>	<b>13.7</b>	<b>50.0</b>
<b>Sum</b>	<b>27.8</b>	<b>29.2</b>	<b>20.7</b>	<b>22.4</b>	<b>100</b>

Source: ERGANI and authors' calculations.

Note: Bold numbers indicate the most important developments.

firm sizes. Each entry of Table 4 presents the growth contribution (in %) for each firm size class (in columns) and worker age group (in rows) to that year's aggregate level employment growth (i.e. 100 stands for a net employment growth of 7.44% in 2017). A couple of interesting findings arise: first, across almost all firm sizes the contribution to net employment growth increases with worker age and, second, small and medium-sized firms play an important role in job creation for younger workers.

## 5.2 DESCRIPTIVE RESULTS AT THE SECTORAL LEVEL

Finally, we look into the sectoral dimension of job creation, job destruction and employment growth. Chart 1 presents each sector's contribution to the aggregate-level moments, thus accounting for each sector's relative importance in aggregate employment.

In terms of the sectoral contributions to the aggregate level of job creation, in Chart 1 we see that the sectors featuring the highest job creation rates are: (1) food services; (2) retail trade; (3) wholesale trade; and (4) accommodation services. Manufacturing as a whole also contributes significantly to aggregate-level employment, as it accounts for 0.7 percentage point of the 2017 net employment growth of 7.44% (see Chart A1 in the Appendix).

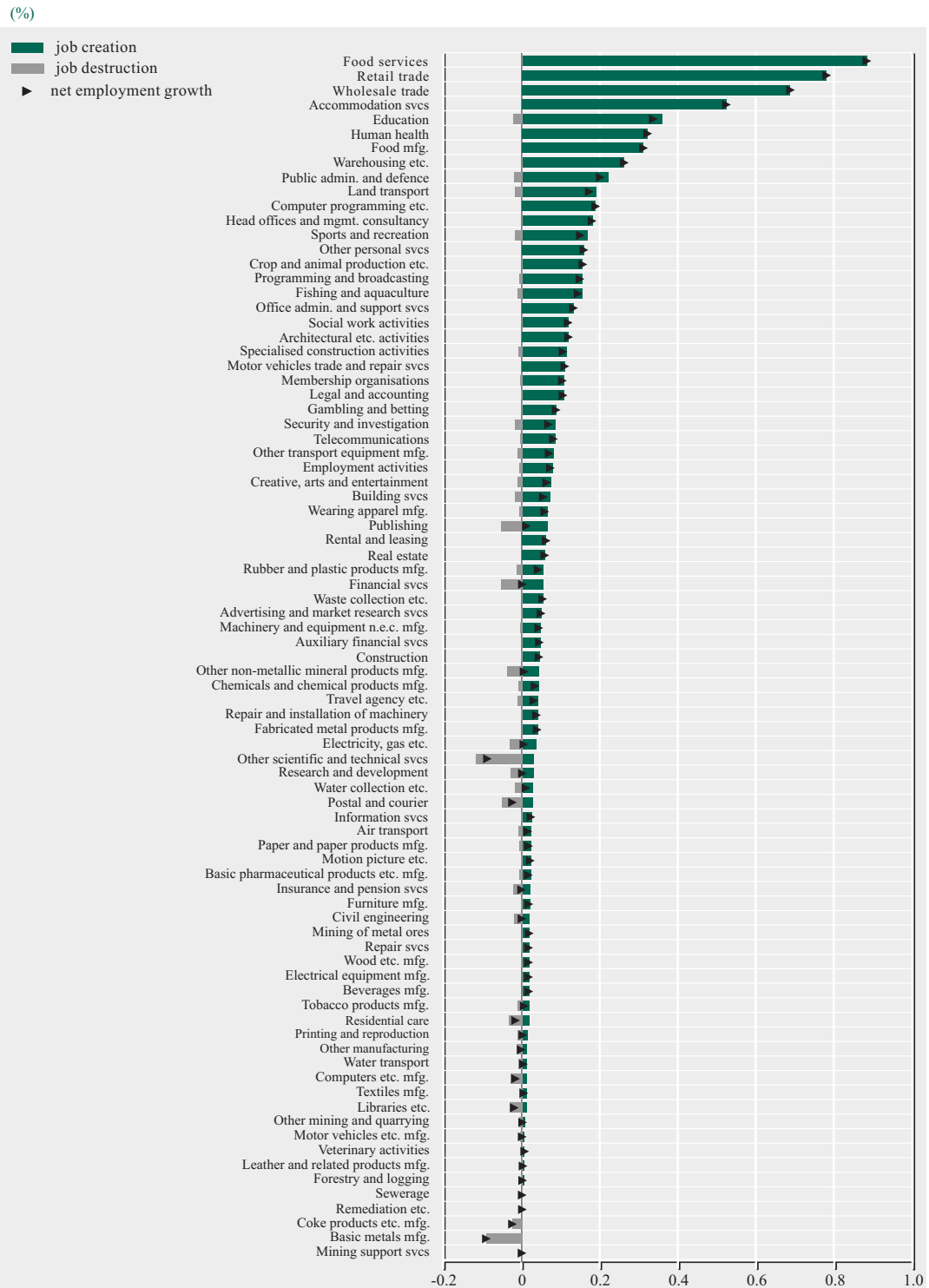
Even so, these results mask significant within-sector heterogeneity in job creation and job destruction.<sup>13</sup> From Chart 2 it is clear that

there is a significant amount of both job creation and job destruction across most sectors of economic activity. Furthermore, there is considerable cross-sectoral variation in these moments. Indeed, overall job reallocation ranges from about 4% in the manufacturing of metal products to 64% in fishery. Interestingly, unlike the findings of earlier studies, job reallocation rates in services do not exceed job reallocation rates in manufacturing industries to a significant degree. In addition, higher job reallocation is associated with higher employment growth (82% correlation) and job reallocation is the strongest among some smaller dynamic sectors like fishery and programming and broadcasting activities.

The sectors with the largest shares in aggregate employment, namely food services, retail and wholesale trade, and accommodation services (which are highlighted in the chart), exhibit only an average degree of job creation and job destruction. By comparison, the manufacturing subsectors are distributed across the entire range of job reallocation, where some sectors such as manufacturing of other transport equipment and manufacturing of tobacco products show high rates of job reallocation as well as employment growth, while others such as manufacturing of textiles and beverages feature below average job reallocation dynamics.

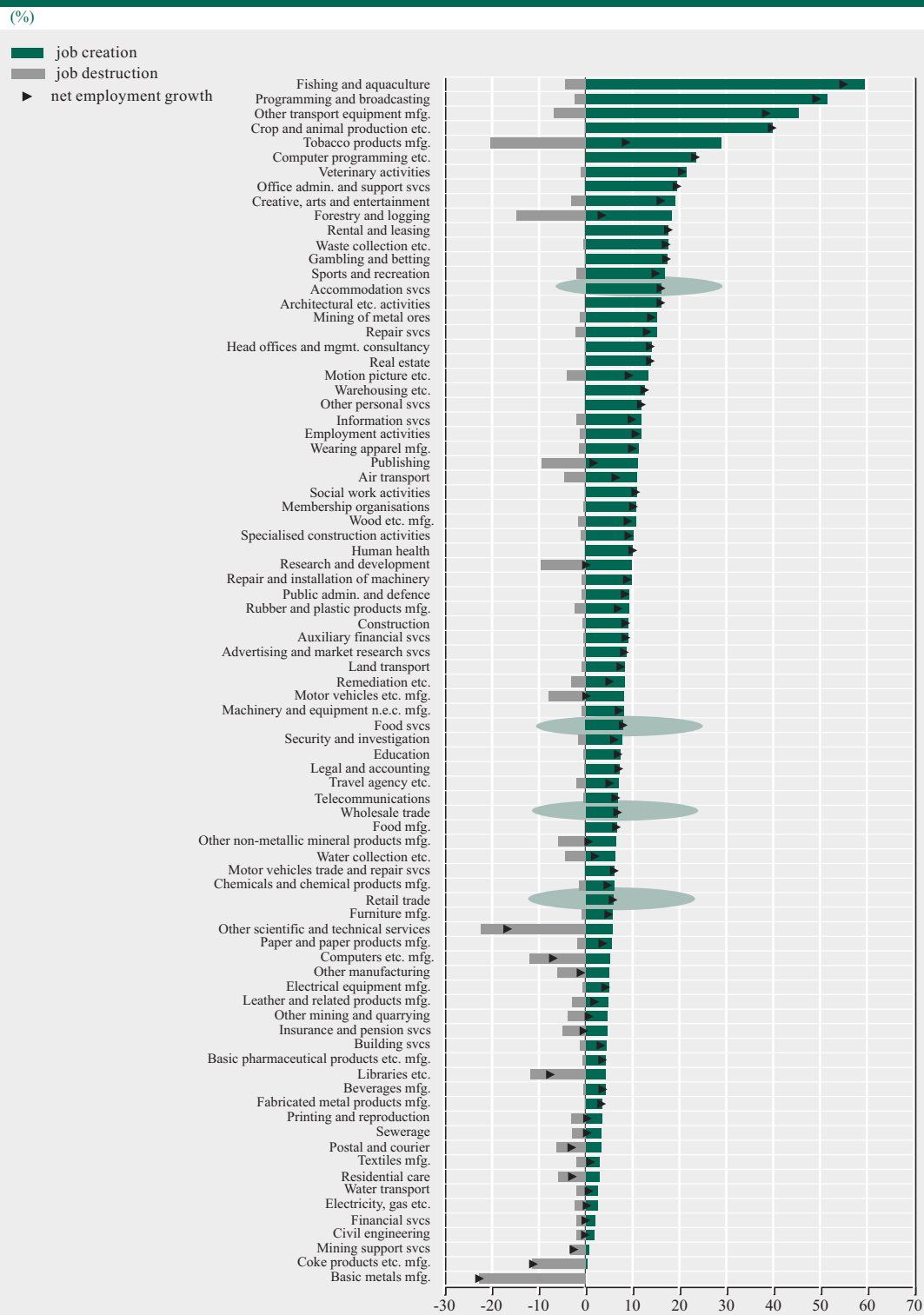
<sup>13</sup> In the analysis of within-sector developments we drop sectors with a very low number of employees (<1000), as relatively few jobs may create large variations in job creation and destruction rates. Specifically, the sectors dropped are the ones with the 2-digit NACE codes: 02, 05, 09, 37, 39, 75, 98 and 99.

**Chart I Job creation, job destruction and net employment growth, by 2-digit NACE: contributions to total economy net employment growth (2017)**



Source: ERGANI and authors' calculations.

**Chart 2 Within-sector job creation, job destruction and net employment growth, by 2-digit NACE (2017)**



Source: ERGANI and authors' calculations.

**Table 5.1 Food services**  
Relative importance of age and size contributions to the year's net employment growth

(%)

Age \ Size	1-10	11-50	51-250	250+	Sum
	<i>2016</i>				
<25	<b>9.66</b>	<b>19.75</b>	3.84	0.15	<b>33.40</b>
25-44	4.36	<b>33.41</b>	5.58	0.41	<b>43.76</b>
44+	6.49	<b>13.82</b>	2.05	0.47	<b>22.84</b>
<b>Sum</b>	<b>20.51</b>	<b>66.98</b>	<b>11.48</b>	<b>1.03</b>	<b>100.00</b>
<i>2017</i>					
<25	8.62	<b>11.12</b>	3.70	0.96	<b>24.40</b>
25-44	<b>11.23</b>	<b>20.11</b>	9.02	2.78	<b>43.15</b>
44+	<b>15.58</b>	<b>12.99</b>	3.59	0.29	<b>32.45</b>
<b>Sum</b>	<b>35.44</b>	<b>44.22</b>	<b>16.31</b>	<b>4.03</b>	<b>100.00</b>

Source: ERGANI and authors' calculations.

Note: Bold numbers indicate the most important developments.

In order to obtain a better understanding of job creation and job destruction in Greece, we take a closer look at the most important sectors, in terms of employment share. Specifically, we investigate the relative importance of firm size classes and worker age categories within each sector (food services, retail trade, wholesale trade, accommodation services and total manufacturing) in order to identify any

particular differences in the drivers of employment growth.

Each of the Tables 5.1-5.5 presents the growth contribution (in %) for each firm size class (in columns) and employee age group (in rows) to that year's sectoral employment growth (e.g. the employment growth of food services in 2016 stood at 10.2% in 2016 and at 8% in 2017).

**Table 5.2 Retail trade**  
Relative importance of age and size contributions to the year's net employment growth

(%)

Age \ Size	1-10	11-50	51-250	250+	Sum
	<i>2016</i>				
<25	6.91	5.28	1.08	4.53	<b>17.79</b>
25-44	<b>13.90</b>	<b>16.24</b>	2.36	<b>13.38</b>	<b>45.88</b>
44+	<b>12.99</b>	<b>6.25</b>	2.59	<b>14.50</b>	<b>36.33</b>
<b>Sum</b>	<b>33.79</b>	<b>27.77</b>	<b>6.03</b>	<b>32.41</b>	<b>100.00</b>
<i>2017</i>					
<25	5.85	4.40	0.64	0.25	<b>11.14</b>
25-44	<b>17.55</b>	<b>14.37</b>	5.30	1.02	<b>38.24</b>
44+	<b>18.79</b>	7.41	4.89	<b>19.54</b>	<b>50.63</b>
<b>Sum</b>	<b>42.19</b>	<b>26.18</b>	<b>10.82</b>	<b>20.80</b>	<b>100.00</b>

Source: ERGANI and authors' calculations.

Note: Bold numbers indicate the most important developments.

**Table 5.3 Wholesale trade**  
Relative importance of age and size contributions to the year's net employment growth

(%)

Age \ Size	1-10	11-50	51-250	250+	Sum
	<i>2016</i>				
<25	3.25	4.35	0.05	-0.93	<b>6.72</b>
25-44	-1.50	<b>27.49</b>	3.51	<b>13.12</b>	<b>42.62</b>
44+	<b>16.44</b>	<b>23.98</b>	7.32	2.92	<b>50.66</b>
<b>Sum</b>	<b>18.19</b>	<b>55.81</b>	<b>10.88</b>	<b>15.12</b>	<b>100.00</b>
<i>2017</i>					
<25	2.86	2.08	3.43	2.90	<b>11.28</b>
25-44	1.34	<b>12.50</b>	6.52	<b>10.36</b>	<b>30.71</b>
44+	<b>15.08</b>	<b>20.40</b>	<b>14.31</b>	8.22	<b>58.01</b>
<b>Sum</b>	<b>19.28</b>	<b>34.98</b>	<b>24.26</b>	<b>21.48</b>	<b>100.00</b>

Source: ERGANI and authors' calculations.

Note: Bold numbers indicate the most important developments.

On balance, we see that young workers make a notable contribution to the food services sector's net employment growth. Indeed, we can note that the food services sector has featured the most extensive use of minimum and sub-minimum wages during 2015-2017. Moreover, food services are characterised by a large and structural turnover of employment over time.<sup>14</sup> These findings are consistent with the low level

of skills needed in the production process of this sector. As such, cost rather than human capital considerations may be the key determinant of job dynamics and net employment growth.

Food services, retail trade and wholesale trade feature a strong relevance of small and

<sup>14</sup> See Bank of Greece (2018b).

**Table 5.4 Accommodation services**  
Relative importance of age and size contributions to the year's net employment growth

(%)

Age \ Size	1-10	11-50	51-250	250+	Sum
	<i>2016</i>				
<25	-0.11	-0.99	-6.59	-2.16	<b>-9.84</b>
25-44	0.03	-9.85	<b>-40.21</b>	<b>-10.24</b>	<b>-60.28</b>
44+	1.17	-5.19	<b>-21.33</b>	-4.53	<b>-29.88</b>
<b>Sum</b>	<b>1.09</b>	<b>-16.03</b>	<b>-68.13</b>	<b>-16.93</b>	<b>-100.00</b>
<i>2017</i>					
<25	1.68	3.78	6.84	0.99	<b>13.29</b>
25-44	6.03	<b>13.75</b>	<b>20.76</b>	6.57	<b>47.11</b>
44+	<b>8.87</b>	<b>11.90</b>	<b>12.86</b>	5.98	<b>39.60</b>
<b>Sum</b>	<b>16.58</b>	<b>29.43</b>	<b>40.45</b>	<b>13.54</b>	<b>100.00</b>

Source: ERGANI and authors' calculations.

Note: Bold numbers indicate the most important developments.

**Table 5.5 Manufacturing (total)**  
**Relative importance of age and size contributions to the year's net employment growth**

(%)

	Size	1-10	11-50	51-250	250+	Sum
<b>Age</b>		<b>2016</b>				
<25		3.44	4.90	2.35	0.96	<b>11.65</b>
25-44		6.17	<b>13.03</b>	7.19	4.42	<b>30.81</b>
44+		<b>12.62</b>	<b>19.47</b>	<b>15.13</b>	<b>10.32</b>	<b>57.54</b>
<b>Sum</b>		<b>22.23</b>	<b>37.40</b>	<b>24.68</b>	<b>15.70</b>	<b>100.00</b>
		<b>2017</b>				
<25		2.48	4.03	1.14	0.64	<b>8.28</b>
25-44		-2.59	8.51	5.70	3.85	<b>15.48</b>
44+		<b>12.35</b>	<b>21.40</b>	<b>21.38</b>	<b>21.11</b>	<b>76.24</b>
<b>Sum</b>		<b>12.24</b>	<b>33.93</b>	<b>28.22</b>	<b>25.61</b>	<b>100.00</b>

Source: ERGANI and authors' calculations.

Note: Bold numbers indicate the most important developments.

medium-sized firms to net employment growth in 2016 and 2017, which is in line with the large concentration of small firms in these industries. Surprisingly, the most dynamic cells in the accommodation services are medium-sized enterprises and employees aged above 25. Small firms' and young workers' contributions are very small in this sector, which may in part reflect the quality upgrade of the tourism sector in Greece with significant increases in higher-end hotel capacity.<sup>15</sup>

In contrast with all other sectors, in manufacturing – a sector with significantly larger needs for skilled labour – net employment growth has been driven mainly by older workers across all firm sizes. Moreover, the contribution of large and very large firms is significant, and job reallocation is increasing with firm size. Specifically, while both job creation and job destruction are increasing with firm size, the positive relationship tends to be stronger in the case of job destruction. This finding may be related to the ongoing transformation of the Greek economy and the investment strategies of firms within the manufacturing sector. In particular, when manufacturing firms faced a significant decline in domestic demand, they had to find other markets for their products, i.e. foreign

markets, in order to survive. However, to be able to serve foreign markets they needed to increase their competitiveness either by becoming more cost-efficient or by differentiating their products. This would require significant investment. Such investment could in many cases act as a substitute for labour. Moreover, in an environment where financial constraints prevail, not all firms are able to finance such investment projects. Usually, larger and more established firms are able to finance investment from their own funds or obtain external funding. In this context, the transformation of the production process would entail increased job reallocation during the initial phase. This reallocation would occur as firms that are not able to follow a restructuring process exit the market (or downsize) while other firms are able to expand.

### 5.3 ESTIMATION RESULTS

We continue our analysis by further exploring the within-sector determinants of job creation and job destruction at the 2-digit sectoral level. Following a well-established literature, we relate sectoral job creation and job destruction

<sup>15</sup> See National Bank of Greece (2017).

to various sectoral characteristics such as wage growth, capital intensity, export intensity and firm creation (or destruction).

We conduct this exercise for job creation, job destruction and job reallocation separately in a simple employment demand setting, where employment growth (positive or negative) depends on wage growth and a variety of other sectoral characteristics. In order to avoid issues of causality and rather obtain correlations between variables which will prove informative, we choose to estimate our relationships of interest using logistic regressions.

Most of the variation in our data comes from the cross-sectional (i.e. sector-level) dimension. Our time dimension is limited, as it includes only 2016 and 2017, and is characterised by strong employment growth for the whole economy. Thus, in order to obtain a clearer picture of the sectoral dimension of job creation and job destruction, we calculate our variables of interest as differences from the sectoral median.<sup>16</sup> Specifically, we define our variables of interest  $\bar{J}C_t$ ,  $\bar{J}D_t$  and  $\bar{J}R_t$  at the sectoral level as being 0 if job creation (job destruction or job reallocation, respectively) in the sector is below the median sectoral job creation (or job destruction or job reallocation) in period  $t$ , or 1 if it is equal to or above the respective sample median. Formally:

$$y_t = \begin{cases} 0, & \text{if } y_t < \tilde{y}_t \\ 1, & \text{if } y_t \geq \tilde{y}_t \end{cases} \text{ where } y_t \in \bar{J}C_t, \bar{J}D_t, \bar{J}R_t$$

Similarly, our matrix of explanatory variables is expressed as:

$$Z_t = \begin{cases} 0, & \text{if } Z_t < \tilde{Z}_t \\ 1, & \text{if } Z_t \geq \tilde{Z}_t \end{cases} \forall z_t \in Z_t$$

That is, each explanatory variable  $z_t$  at time  $t$  is 0 if its value is below the variable's sectoral median in period  $t$ , or 1 if it is equal to or above. Thus we fit a logistic regression of the form:

$$\Pr(y_t \neq 0 | z_{it}) = \frac{\exp(z_{it}\beta)}{1 + \exp(z_{it}\beta)}$$

Our explanatory variables are: (1) median wage growth; (2) capital intensity; (3) export

intensity; and (4) the change in the number of firms in each sector (i.e. net birth or death of firms).<sup>17</sup> The sector-level median wage and the change in the number of firms are drawn from the ERGANI database.<sup>18</sup> Export intensity is calculated as the share of exports in gross output at the sectoral level (in nominal terms) from the national accounts statistics which are available at the sectoral level.<sup>19</sup> Finally, sector-level capital intensity is from Gibson (2010) and Gibson and Pavlou (2017).<sup>20</sup> In order to obtain a representative magnitude of the sectoral capital intensity, we approximate the sectoral capital intensity with its pre-crisis average. The main reason is that capital intensity is calculated as the capital stock relative to output at the sectoral level. During the crisis, however, output dropped dramatically, while the capital stock moved sideways as it adjusted only with a considerable lag. As such, the implied sectoral capital intensity during the crisis and recovery years is not an appropriate measure and is thus approximated with its pre-crisis average.

The results summarised in Table 6 show that above-median wage growth at the sectoral level is –as expected– correlated with below-median job creation. However, wage growth is not related to job destruction. Above-median job creation is also positively related to above-median capital intensity and net firm growth. By contrast, job destruction is negatively related to net firm growth. Moreover, job destruction is found to be pos-

<sup>16</sup> A similar approach is taken by Fernández et al. (2017), who also use micro-aggregated data. Moreover, by using the differences from the median rather than the mean, we do not let extreme values influence our results.

<sup>17</sup> Additional sector-level explanatory variables used in the estimations included: value added growth, total factor productivity growth and labour productivity (gross value added per person employed). They are not presented in Table 6, as they are insignificant.

<sup>18</sup> For each sector and year, we have data on the number of firms from ERGANI Annual Reports. As such, any changes between the years are expressed in net terms for lack of data on new entries and exits of firms in a sector.

<sup>19</sup> The results remain unchanged if we use exports to value added at the industry level or if we use the mean wage growth of each sector.

<sup>20</sup> National accounts data are available at the 64 NACE sectors. They were merged with the 87 (finer) ERGANI sectors by assuming that export intensity is shared among all 2-digit industries belonging to the same group in the national accounts statistics.

**Table 6 Logistic regression: employment growth and sectoral characteristics**

Dependent variable	Job creation		Job destruction		Job reallocation	
	Coef.	z-stat.	Coef.	z-stat.	Coef.	z-stat.
Wage growth	<b>-1.06</b>	<b>-2.91</b>	0.33	0.95	<b>-0.69</b>	<b>-1.88</b>
Export intensity	-0.22	-0.58	<b>1.05</b>	<b>2.98</b>	<b>1.06</b>	<b>2.73</b>
Capital intensity	<b>0.73</b>	<b>1.92</b>	0.32	0.92	<b>1.05</b>	<b>2.82</b>
Net firm growth	<b>1.56</b>	<b>4.22</b>	<b>-0.63</b>	<b>-1.81</b>	<b>1.48</b>	<b>3.86</b>
Constant	-0.54	-1.40	-0.53	-1.48	-1.46	-3.28
Number of obs		150		150		150
Wald chi <sup>2</sup> (3)		27.66		15.01		29.62
Prob > chi <sup>2</sup>		0.00		0.00		0.00
Pseudo R <sup>2</sup>		0.15		0.08		0.17
Log pseudolikelihood		-88.09		-96.00		-86.04

Note: Bold numbers indicate statistically significant results.

itively related to export intensity.<sup>21</sup> While the former finding is plausible, the latter is somewhat counterintuitive, as Greek exports have grown strongly during the crisis years. First, we can note that this result appears to be driven mainly by a number of export-intensive sectors that are relatively small in terms of their relevance for aggregate employment (each having fewer than 5,200 workers).<sup>22</sup> Second, this result may be due to the fact that we can control for export intensity only at the sectoral level. In principle, when referring to export intensity, one has in mind large and dynamic firms that are growing in order to be able to serve foreign markets. Indeed, such firms would show lower volatility and more stable employment – at the firm level – due to the diversification opportunities that exporting offers. While this may be true at the firm level, at the sectoral level we can observe creative destruction. Specifically, dynamic growing firms coexist with less efficient firms that downsize or may close down. If the creative destruction effect dominates during the period of transformation, it would appear – at the sectoral level – that export intensity may be related to increased job destruction.<sup>23</sup>

## 6 CONCLUSIONS

This paper used detailed data on private sector dependent employment in Greece for the period 2015-2017 that are disaggregated at the level of sector, firm size and employee age to analyse employment growth and the determinants of job creation and destruction.

As in most studies in this field, we find that there is simultaneous job creation and job destruction and, most importantly, that aggregate net employment growth rates mask important heterogeneity across sectors of activity, firm sizes and age groups.

Interestingly, vigorous job creation for workers in the 44+ age group is an important contributor to total economy net employment

<sup>21</sup> A similar result was found by Levinsohn (1999) using Colombian data and is discussed in Pisu (2008).

<sup>22</sup> When using the full sample of sectors, the result is robust to inclusions of firm size variables as well as to interactions of firm size variables with export intensity. Specifically, we create the share of sectoral employment by (a) very large firms or (b) by large and very large firms, create a dummy variable which is equal to 1 if the shares belong to the 75th percentile or above and include it as a regressor.

<sup>23</sup> This explanation is brought forward by Pisu (2008), who defines participation in international markets at the firm level. He finds that firms participating in international markets have a lower job reallocation rate than domestic ones.



growth, a development which is similar to developments in other euro area countries. Also, as expected, job creation is negatively related to wage growth and positively related to firm growth.

Contrary to the findings of the literature, we find that job reallocation in Greece during the period of our investigation increases with firm size. Furthermore, export intensity is found to

be positively related to job destruction. Taken together, these findings of high job reallocation among large firms and export-intensive sectors are consistent with the job dynamics expected in the presence of creative destruction and extensive uncertainty. Both of these forces have been relevant in shaping employment dynamics during the recent years, as the recovery of activity and the increasing openness of the Greek economy gradually gained pace.

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## APPENDIX

**Table A1 Cross contribution of age and size to net employment growth in 2016**

(%)

Size \ Age	<25	25-44	44+
1-10	0.36	<b>0.63</b>	<b>0.82</b>
11-50	0.41	<b>1.13</b>	<b>0.86</b>
51-250	0.08	0.26	0.49
250+	0.11	0.14	<b>0.56</b>

Source: ERGANI and authors' calculations.

Note: Bold numbers indicate the most important developments.

**Table A2 Cross contribution of age and size to net employment growth in 2017**

(%)

Size \ Age	<25	25-44	44+
1-10	0.31	<b>0.75</b>	<b>1.00</b>
11-50	0.31	<b>0.94</b>	<b>0.92</b>
51-250	0.16	0.61	<b>0.77</b>
250+	0.09	0.55	<b>1.02</b>

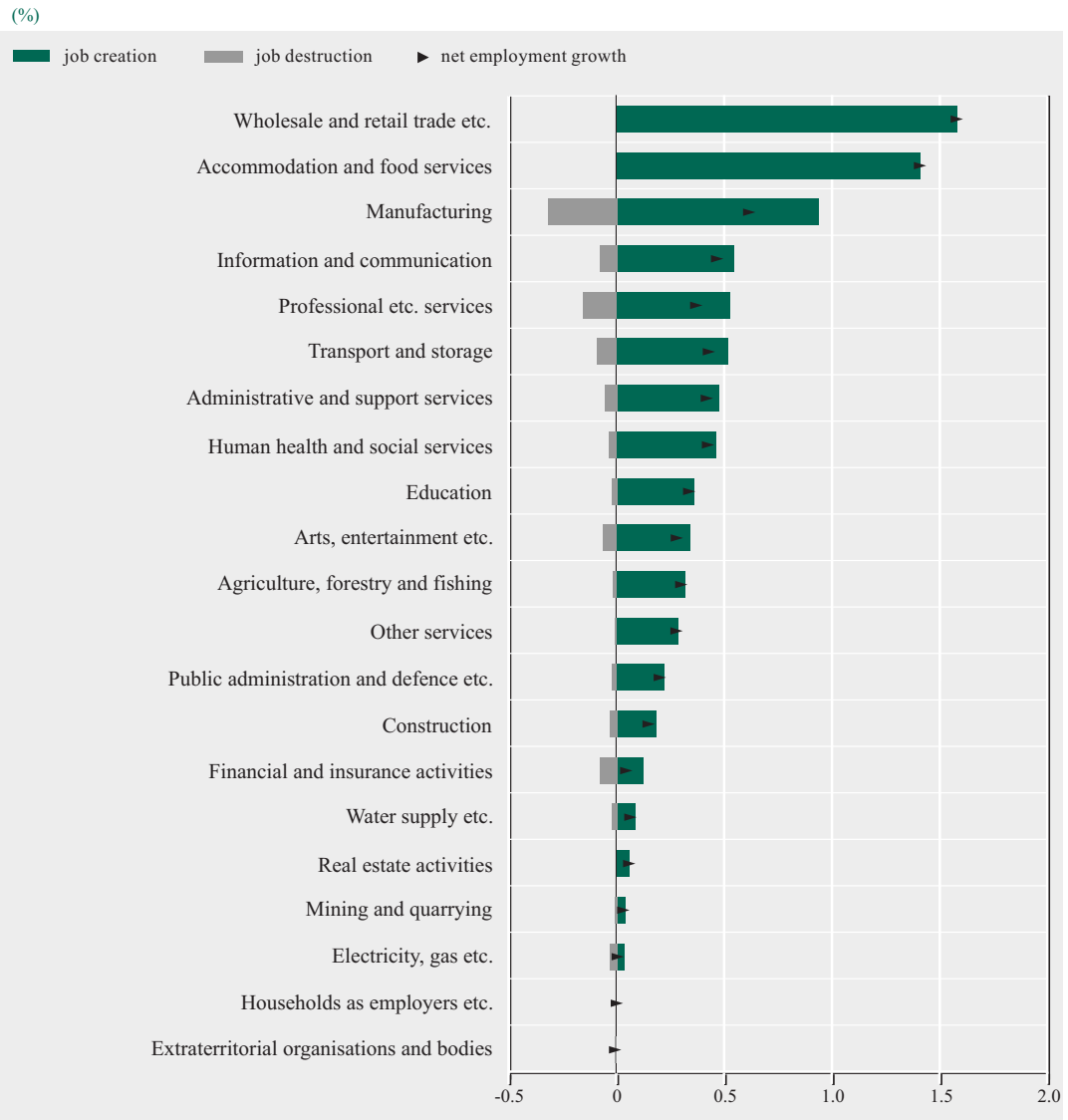
Source: ERGANI and authors' calculations.

Note: Bold numbers indicate the most important developments.

**Table A3 Correlation matrix**

Above average	Above average						
	Job creation	Job destruction	Job reallocation	Export intensity	Wage growth	Net firm growth	Capital intensity
Job creation	1						
Job destruction	0.12	1					
Job reallocation	0.64	0.26	1				
Export intensity	-0.05	0.21	0.08	1			
Wage growth	-0.15	0.04	-0.13	-0.04	1		
Net firm growth	0.32	-0.08	0.29	-0.17	-0.09	1	
Capital intensity	0.18	0.04	0.12	0.04	0.02	0.04	1

**Chart A1 Job creation, job destruction and net employment growth, by 1-digit NACE: contributions to total economy (2017)**



Source: ERGANI and authors' calculations.