The role of marginal workers in Danish unemployment

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Unemployment risk is highly heterogeneous in Denmark: a group of marginal workers constitutes 15 per cent of the labour force but makes up roughly 60% of the unemployed in Denmark. These marginal workers cycle more through jobs, have longer and more frequent spells of unemployment and leave their jobs at higher pace. Empirical evidence suggests that marginal workers are less productive than the average worker. They are also more likely to be dependent on labour income: marginal workers have less potential income insurance via partners or parents. These findings better allow us to forecast the development of unemployment, output, and wages.

Marginal workers drive unemployment

Despite only making up 15% of the labour force, marginal workers constitute 60% of the unemployed. Their unemployment is more cyclical than that of the average person.

Marginal workers have worse outside options

Measured by the income and wealth of partners and parents, marginal workers are more dependent on labour income than the average Dane.

Marginal workers are likely less productive

Income and health data suggest that marginal workers are less productive in their jobs than the average Dane.

Why is this important?

Better understanding the pool of unemployed workers and in particular their reason of unemployment allows Danmarks Nationalbank to make better forecasts about the development of unemployment, wages, and output. Danmarks Nationalbank continuously oversees the Danish economy to meet our objective of ensuring price stability.

Main chart: Marginal workers' unemployment fell strongly during covid-19 pandemic

Unemployment rate

Legend: ◆ Stable workers   ◆ Marginal workers
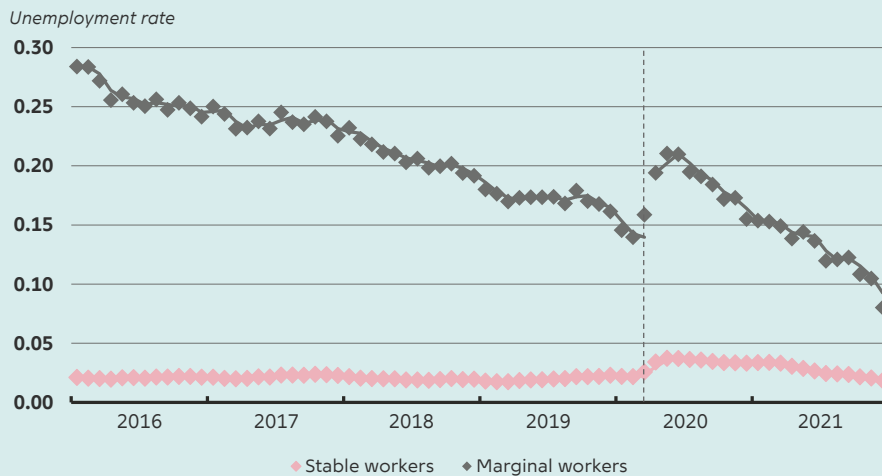
Keywords

Labour market   Danish economy

01
Introduction

Danish unemployment has been fluctuating significantly during the financial crises and, more recently, the covid-19 pandemic. These aggregate fluctuations mask significant differences in the exposure of the Danish labour force to unemployment risk.

In this memo, I cluster workers into two groups ('stable' and 'marginal') based on their pre-pandemic historical employment patterns. I uncover significant differences in the cross-section: marginal workers make up only 15% of the Danish labour force but have an unemployment rate of 35% – much higher than the average unemployment rate of 5%. Despite only making up 15% of the Danish labour force, marginal workers make up 60% of total unemployment, and add significantly to cyclical fluctuations in the unemployment rate.
Marginal workers are equally represented among men and women, and among workers of different age groups, occupations and industries. They are more numerous among workers with fewer years of schooling. There are slightly more marginal workers among rural populations than in the largest Danish cities.

In a second step, I focus on the reasons for these different employment patterns. Workers can be non-employed because of good outside options (so that they are less dependent on labour income, and less willing to work for a given wage), or because of low labour productivity (so that firms are less willing to employ them for a given wage). I show that marginal workers are less likely to have a registered partner, and any partners earn less than the average Dane. Furthermore, marginal workers have less wealth and are more likely to have been delinquent on their debt (23% vs 13%).
These findings together suggest that, if anything, marginal workers have worse outside options. I then focus on measures of worker productivity. The so-called Mincer residual controls for observable differences and is often used as a measure of worker productivity. Marginal workers have a significantly lower Mincer residual. Even when controlling for the individual firms that workers are employed at (the so-called AKM fixed effect), marginal workers have a lower wage residual than stable workers, which suggests lower productivity.
When turning towards the Labour Force Survey, I show that marginal workers are much more likely to be employed in temporary jobs (18% vs 4% of stable workers), and that 15% of their job separations are due to economic factors (6% of stable workers). I find evidence suggesting that marginal workers are more likely to have mental health issues (a 50% higher rate of visiting psychologists, and 100% higher rate of visiting psychiatrists). While not directly a measure of productivity, it is likely that workers with mental health problems are less productive in their jobs.

The employment rates of marginal workers have been catching up during the post-pandemic recovery. Indeed, their unemployment rates are at a historical low. The findings here suggest that many of the recently hired workers are less experienced and less productive than the historical average – potentially contributing negatively to average aggregate productivity.

02

Estimation of stable and marginal workers

I cluster Danish workers into two groups based on moments of their employment history[1]. Table 1 summarises the two groups and their moments. 85% of workers are placed in the first group, 'stable' workers. These workers on average have long-lasting jobs: 54% of them have jobs that lasted longer than two years. Their employment gaps are usually short: 98% of their non-employment spells are less than a month (implying a high share of job-to-job transitions). Virtually all stable workers that become unemployed find a job within the next 6 months. On average, they change jobs every 4 years, and their average unemployment rate is 3%. These moments are very different for the remaining 15% of the labour force, which I call 'marginal' workers. Only 27% of marginal workers' jobs last longer than two years, and only 86% of their non-employment spells are less than one month (implying a much lower share of job-to-job transitions). 6% of unemployed marginal workers have an unemployment duration of longer than 6 months, and their jobs last an average of 2 years. Their average unemployment rate is 35%.

TABLE 1

Marginal workers: not your average Dane

	Worker type	
	Stable	**Marginal**
# Obs.	1,151,339	209,723
Share	0.85	0.15
Clustering		
Match: 1-3M	0.11	0.16
Match: 3-6M	0.08	0.17
Match: 6-12M	0.10	0.18
Match: 12-24M	0.17	0.21
Match: 24+M	0.54	0.27
Non-emp: 0-1M	0.98	0.86
Non-emp: 1-3M	0.01	0.05
Non-emp: 3-6M	0.01	0.03
Non-emp: 6-12M	0.00	0.03
Non-emp: 12+M	0.00	0.03
#Jobs per month	0.02	0.05
Non-employment rate	0.00	0.05
Unemployment rate	0.03	0.35

Note: Labour market histories by worker type. Computation explained in Box 1.
Source: Statistics Denmark and own calculations.

[1] The sample period is 2008 to 2018. The clustering process is data-demanding: only half of the Danish labour force can be clustered. Most of the remaining workers are not classified due to the age restriction. One-fourth of unclassified workers are not sufficiently attached to the labour force. For further details on the clustering, see Box 1.

03

Marginal workers drive aggregate unemployment

Marginal workers have a higher unemployment rate than stable workers, but also only make up 15% of the labour force. Ex ante, it is not clear whether the aggregate unemployment rate is driven by this minority of workers.

Chart 1 shows the total number of unemployed by worker group for the past 14 years: approximately 60% of the unemployed are marginal workers. Moreover, they also drive aggregate fluctuations in the unemployment rate: during the financial crises, the pool of unemployed increased by 100,000 marginal workers, and only 25,000 stable workers.

CHART 1

Total unemployment by worker type
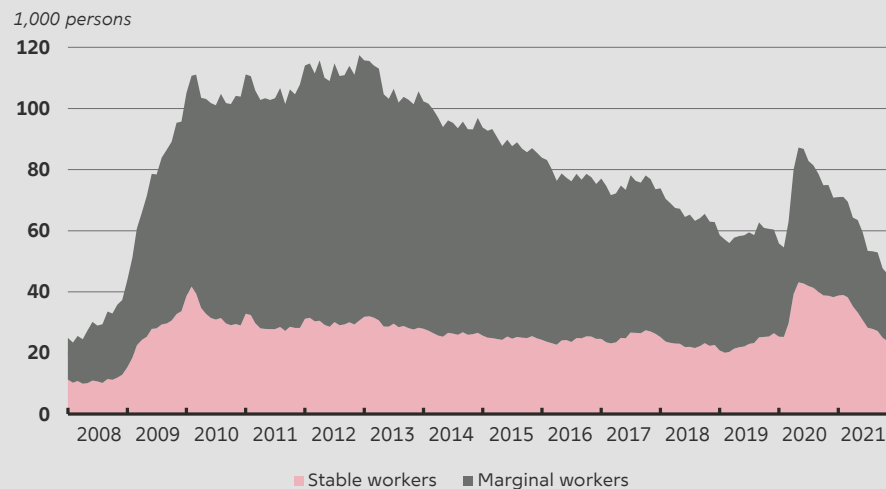
Note: Monthly number of unemployed by worker type. Unemployment measured as unemployment
        benefit recipients without labour income.
Source: Statistics Denmark and own calculations.

Who are these marginal workers? Table 2 computes the basic characteristics of the two groups. We can see that there is almost no difference across the two groups in terms of age and gender. A significantly higher share of marginal workers has high school education or less (30% vs 17%). No strong regional differences are observed for marginal workers. They are, to some extent, more likely to be found among non-Danish citizens and Danes of non-Danish origin.

TABLE 2

Marginal workers have less education

	Worker type	
	Stable	**Marginal**
# Obs.	1,151,339	209,723
Share	0.85	0.15
Worker characteristics		
Male	0.53	0.51
Age	46.70	45.81
Education: high school or less	0.17	0.30
Large city	0.61	0.60
Rural municipality	0.18	0.20
Danish citizen	0.94	0.89
Non-Danish origin	0.10	0.18

Note: Average worker characteristics by worker type.
Source: Statistics Denmark and own calculations.

04

Marginal workers have worse outside options

Are marginal workers less likely to work because they have better outside options and thus rely less on labour market income? To address this question, I enrich the data with marital status and information on wealth and debt.

Table 3 focusses on registered partnerships. Partnerships are an important outside option since a non-employed worker can rely on the income of their spouse. Table 3 shows that a better outside option cannot explain the worse labour market outcomes of marginal workers. Throughout the 2008-2018 period, 62% of stable workers had a registered partner. This number is much lower for marginal workers (46%). Next, I focus on the partner's earnings for workers that do have a registered partner. For stable and marginal workers, the partner's average log earnings is 12.53 and 12.31, respectively. This difference in log earnings implies 20% lower average earnings for the partners of marginal workers. I conclude that marginal workers are less likely to have partners, and those that do have partners, have partners with lower earnings. Indeed, Table 3 shows assortative mating: stable workers are more likely to be partnered with stable workers, and marginal workers are more likely to be partnered with marginal workers.

TABLE 3

Marginal workers: fewer partners

	Worker type	
	Stable	**Marginal**
# Obs.	1,151,339	209,723
Share	0.85	0.15
Worker relationship		
Has partner	0.62	0.46
Had partner	0.14	0.18
Partner: high school or less	0.12	0.15
L. earnings (partner)	12.53	12.31
L. earnings rel to partner	0.12	-0.33
Partner cluster missing	0.49	0.51
Partner worker type: Stable	0.89	0.78
Partner worker type: Marginal	0.11	0.22

Note: Average characteristics of worker's partner by worker type, for those that have a registered
          partner. Partnerships include marriages and registered partnerships. L. earnings: log earnings.
Source: Statistics Denmark and own calculations.

Perhaps marginal workers have better balance sheets, with higher wealth and lower debt? In that case, a lesser need to satisfy debt obligations could explain their lower employment rates. Table 4 shows that this is not true: marginal workers have, on average, less than half of the wealth of stable workers[2]. In contrast to the stark differences in wealth, they have almost identical interest payments on outstanding debt (kr. 8,700 vs kr. 10,960). In line with the relatively high debt obligations, marginal workers have worse credit histories: 23% of marginal workers have at some point been delinquent on their debt obligations (versus 13% of stable workers).

TABLE 4

Marginal workers: less wealth and higher debt delinquency

	Worker type	
	Stable	**Marginal**
# Obs.	1,151,339	209,723
Share	0.85	0.15
Worker wealth		
Net wealth ('000s)	274.34	98.17
No loans found	0.03	0.03
Ever delinquent	0.13	0.23
Interest payments ('000s)	10.96	8.70

Note: Average wealth and loan information by worker type. Ever delinquent: worker was delinquent on some loan between 2008 and 2018. Interest payment: average interest payment on loans during that horizon.
Source: Statistics Denmark and own calculations.

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[2] Wealth is calculated at the worker, and not the household level. Due to the assortative mating discussed previously, it is unlikely that household-level wealth figures would change the findings.

05

Marginal workers are likely less productive

We have seen that by all accounts, marginal workers have worse outside options than stable workers. I now turn towards the other possible explanation of lower employment rates: lower productivity. Perhaps marginal workers are, on average, less productive than stable workers? If that was the case, it would be more difficult for marginal workers to find stable employment: they would cycle through more jobs, which would lead to more matches that last for shorter durations, as we have seen in Table 1. A worker's productivity not observed directly.

Table 5 shows that marginal workers work on average fewer hours and have lower annual earnings. They are 4% more likely to be employed part-time. Marginal workers employed part-time are 2% more likely to report that their part-time employment is due to their inability to find a full-time job. Marginal workers are approx. four times as likely to be employed on temporary contracts (18% vs 4%), and 15% of marginal workers report that their last job separation was on economic grounds (meaning that they either were laid off for cause, or because of their employer's financial problems).

TABLE 5

Marginal workers earn less

	Worker type	
	Stable	**Marginal**
# Obs.	1,151,339	209,723
Share	0.85	0.15
Worker earnings		
Monthly hours worked	132	116
Annual earnings ('000s)	374	219
Part-time	0.17	0.21
Part-time: cannot find full-time	0.18	0.20
Temporary	0.04	0.18
Mincer resid.	-0.02	-0.12
AKM worker FE	0.02	-0.09
Separation: economic reason	0.06	0.15

Note: Average worker career information by worker type. Mincer resid.: Mincer residual estimated on the entire population. Separation: economic reason: previous separation from job was due to economic factors.

Source: Statistics Denmark and own calculations. Information on part-time work, temporary jobs and separation reasons is drawn from the EU labour force survey.

Many economic theories are based on (partly) competitive labour markets, which suggests that more productive workers earn higher wages. Table 5 also reports the so-called Mincer residual: it contains the variation in wages that is unexplained by observable characteristics. Intuitively, it states how much more (or less) a worker earns than comparable other workers. As we can see, the Mincer residual of marginal workers is significantly lower than that of stable workers (assuming perfectly competitive labour markets, it suggests that marginal workers are 10% less productive than stable workers). It could be that marginal workers earn less because they are typically employed in firms that pay less. To test this, one can compute the "AKM worker fixed effect", which additionally controls for the firm of employment. We can see that this is indeed true: the AKM FE of marginal workers is somewhat higher than their Mincer residual (-0.09 vs -0.12), suggesting that their wages are 3% lower due to being employed in firms that typically pay less. This does not explain the entire wage difference between worker types: the AKM FE of marginal workers is still roughly 10 percentage points lower than that of stable workers.

Another potential proxy for worker productivity is mental health. Less productive workers could be stressed more by their jobs, and thus have mental health issues. Alternatively, other factors in life could lead to mental health issues, which then negatively affect the workers' productivity on the job. Table 6 focuses on visits to hospitals, psychiatrists and psychologists by the two worker types. We can see that marginal workers are 50% more likely to visit a psychologist (15% vs 11%), and twice as likely to visit a psychiatrist (8% vs 4%).

TABLE 6

Marginal workers: worse mental health

	Worker type	
	Stable	**Marginal**
# Obs.	1,151,339	209,723
Share	0.85	0.15
Worker health		
Any hospital visit	0.50	0.56
Hospital visit: mental illness	0.03	0.03
Visit: psychiatrist	0.04	0.08
Visit: psychologist	0.11	0.15

Note: Average (mental) health variable by worker type. Each variable covers any visits by workers between 2008 and 2018.
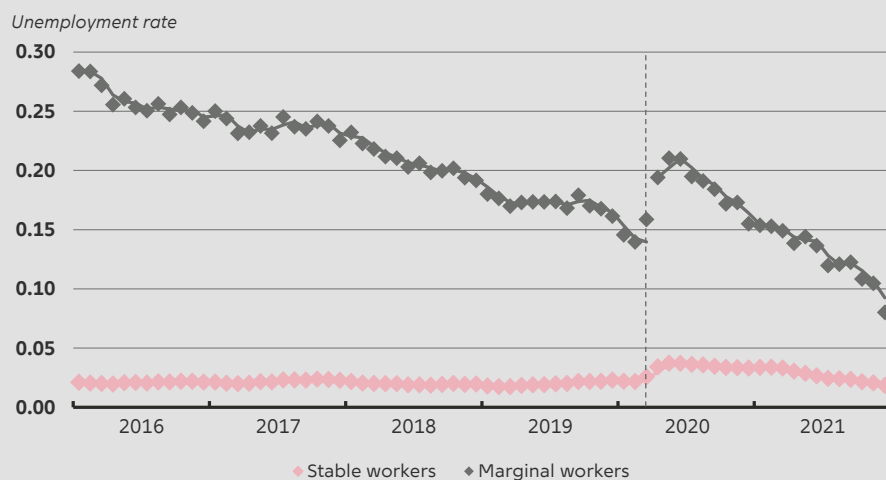Source: Statistics Denmark and own calculations.

06
Recent developments

Finally, we turn to recent developments in the Danish unemployment rate. The unemployment rates of marginal workers increased by roughly 6 percentage points during the onset of the pandemic. Since the beginning of the recovery in 2021, these unemployment rates have fallen strongly to a level that has not been seen in the past 15 years. This suggests that many of the recently hired workers are indeed marginal workers with less work experience, worse outside options and lower productivity. The post-pandemic recovery has presented these workers with an entry into the labour market that might permanently improve their labour market outcomes.

CHART 2

Marginal workers' unemployment fell strongly during covid-19 pandemic

Note: Average unemployment rate by cluster type. Workers count as unemployed that receive unemployment benefits and no wage income.
Source: Statistics Denmark and own calculations.

Bibliography

Gregory, Victoria and Menzio, Guido and Wiczer, David, The Alpha Beta Gamma of the Labor Market (April, 2021). FRB St. Louis Working Paper No. 2021-3

Mueller, Andreas I. 2017. "Separations, Sorting, and Cyclical Unemployment." American Economic Review, 107 (7): 2081-2107.

Read also

Empirical approach

In what follows, I summarise my approach to cluster workers based on their employment history. I follow closely the approach outlined by Gregory, Menzio and Wiczer (2021) and adjust it to the Danish administrative data.

I enrich Danish matched employer-employee data (BFL) with data on social security benefits (DREAM). I use BFL to capture the duration of each employment and non-employment spell of each worker. Unemployment benefits are used to compute each worker's average unemployment rate.

The sampling period are the years 2008-2018. I focus on prime-aged workers that are strongly attached to the labour force, and require workers to be in the data for at least 5 years. Detailed sample restrictions and corresponding sample sizes are provided in Table 7.

I summarise the employment history of each of these workers as follows. I categorise job spells into five groups ranging from very short (1-3 months) up to very long (longer than two years) and compute for each worker the share of spells that fall into each category. Similarly, I compute for each worker the share of non-employment spells that fall into four non-employment duration categories. For each worker, I further compute the number of different jobs attained (normalised by months observed in the data), the average non-employment rate and the average unemployment rate (which is computed using DREAM). I reweight and standardise the moments in order to make them comparable.

I then use the 12 moments to cluster these workers into two groups using a k-means algorithm. Intuitively, this algorithm attempts to sort workers into clusters such that the average difference of the 12 moments is minimised within each cluster, and maximised across the clusters. Table 1 provides an overview of the 12 moments by group: as we can see, the clustering exercise reveals significant differences between stable and marginal workers across most moments.

Data
The clustering exercise is based on employment spells which I compute using BFL and DREAM. For the subsequent analysis, I enrich the data with information emigration status and partners (BEF), hospitalisation and doctor visits (SSYN and SSSY), loans (URTEPERS), wealth (IND) and the EU labour force survey (AKU).

TABLE 7

Clusters are estimated for half of the Danish labour force

# Obs	Sample restriction
3,403,262	In labour force during sample period
2,093,293	Within the age 30-60
1,915,878	At least two years in the labour force
1,716,999	At least 12 months employed
1,678,643	Maximum non-employment spell less than 2 years

Note: 3.4 million workers are observed between 2008-2018. This table lists the number of observations after each additional sample restriction.
Source: Statistics Denmark and own computations.

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