ECONOMIC MEMO

LOW FOR LONG

DANMARKS NATIONALBANK

2 MAY 2022 — NO. 6

Looking beyond the impact of energy prices: What drives trend inflation in Denmark?

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Looking beyond the impact of energy prices: What drives trend inflation in Denmark

Abstract

Over the decade that preceded the pandemic recession, wage and price inflation remained low in Denmark and other advanced economies, despite falling unemployment rates. We attribute the subdued inflation to a fall in the propensity of employed workers to look for other jobs and higher wages. This propensity to search on the job is for Danish employees in June 2021 at around the same low levels as observed before the pandemic recession. Unless the employed become more active in the labour market, the same forces that constrained inflation prior to the pandemic recession may continue to operate and affect the pattern of inflation once the current rise in energy and commodity prices has fully passed through to consumer prices.

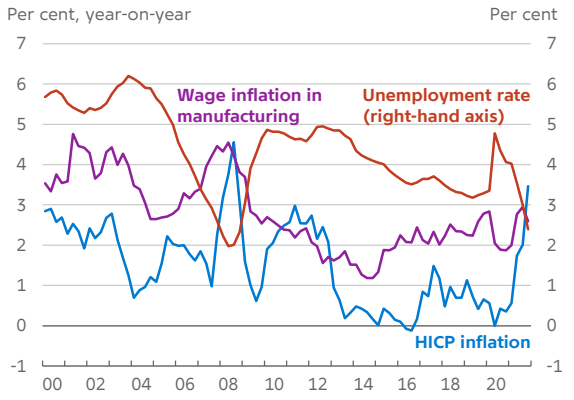
Denmark is currently facing the highest HICP inflation for decades, and wage growth is at its highest level since 2007-08. The recent development in prices and wages stands in stark contrast to the disinflationary pressures experienced by Denmark and other advanced economies over the decade that preceded the pandemic recession. This Economic Memo investigates the nature of these disinflationary pressures. It is intended as a guide to understanding inflation in the future, i.e. once the increase in energy and commodity prices has fully passed through to consumer prices, and labour market conditions come back to shaping inflation patterns.

Chart 1 shows that price and wage inflation fell markedly over the second decade of this century, relative to the first. Specifically, the average growth rate of HICP inflation nearly halved, falling from an average of about 2 per cent recorded between 2000Q1 and 2009Q4 to close to 1 per cent over the 2010Q1 to 2019Q4 period. Similarly, wage inflation dropped from an average of around 4 per cent to about 2 per cent. Chart 1 also shows that the negative trend in both wage and price inflation was accompanied by a downward trend in the rate of unemployment. This is at odds with the traditional argument that a lower rate of unemployment should induce higher inflationary pressures.

A possible reason for the lack of a clear relationship between wage growth and the unemployment rate could simply be that the latter is not the best measure of labour market slack. A better measure, arguably, is the unemployment gap, defined as the difference between the actual and structural rate of unemployment. However, Kristoffersen (2018) shows that after the Great Recession, wage inflation became increasingly disconnected also from the unemployment gap. As explicitly noted by the author, starting around 2013, nominal wage growth seems to have responded only to a limited extent to

the declining unemployment gap and the ensuing increase in labour market pressures.[1]

Low inflationary pressure in Denmark despite fall in unemployment rate Chart 1



Note: Unemployment consists of recipients of unemployment benefits and recipients of social benefits including those in activation.
Source: Own calculations and Statistics Denmark.

This memo reviews the well-known findings that the disconnect between inflation and unemployment rates in the decade that preceded the pandemic recession is an international phenomenon seen across some major advanced countries.[2] It proposes an explanation for the fall in trend inflation that emphasises the role of employed workers searching for jobs. Specifically, we show that the share of workers moving from one employer to another has fallen persistently after the recession of 2009, both in Denmark and in other advanced economies. We then argue that this fall is likely to reflect a decrease in workers' propensity to search on the job. Finally, we claim that a fall in the propensity of the employed workers to look for other job opportunities may have caused a decrease in wage competition between firms in recruiting employed workers, leading in turn to a fall in inflationary pressures.

Looking at the more recent period covering the pandemic recession and the period up until June 2021, we find that the share of employed workers searching for jobs is at around the same low levels observed before the recession. The current disruptions to international supply chains, high energy prices and the scarcity of unemployed job seekers could contribute positively to price inflation going forward. As shown in Chart 1, wage inflation has already picked up, starting in 2021Q2.[3] If higher wage inflation induces more search on the part of the employed, there is a risk that inflation may rise even further.

There is great uncertainty both about the strength of the various forces that matter for the inflation outlook and about the time horizon over which their effects will unfold. This memo does not aim to provide a quantitative assessment of their separate roles. The two main lessons from this memo can be summarised as follows. First, the behaviour of employed job seekers appears to be a promising explanation for the subdued inflation observed over the course of the past decade in various advanced economies, including Denmark. Second, the propensity of employed workers to search on the job tends to fall in economic expansions, which suggests that inflation will remain subdued also over the coming years. In turn, a persistently low propensity to search on the job should give rise to longer running deflationary pressures similar to those operating prior to the pandemic. There are, however, upside risks to this scenario. In particular, in the US, where survey data are already available up to February 2022, a marked increase can be seen in the rate at which employed workers quit their jobs and in employment-to-employment transitions. This is an interesting anomaly, given that the propensity of US workers to search on the job tends to decline

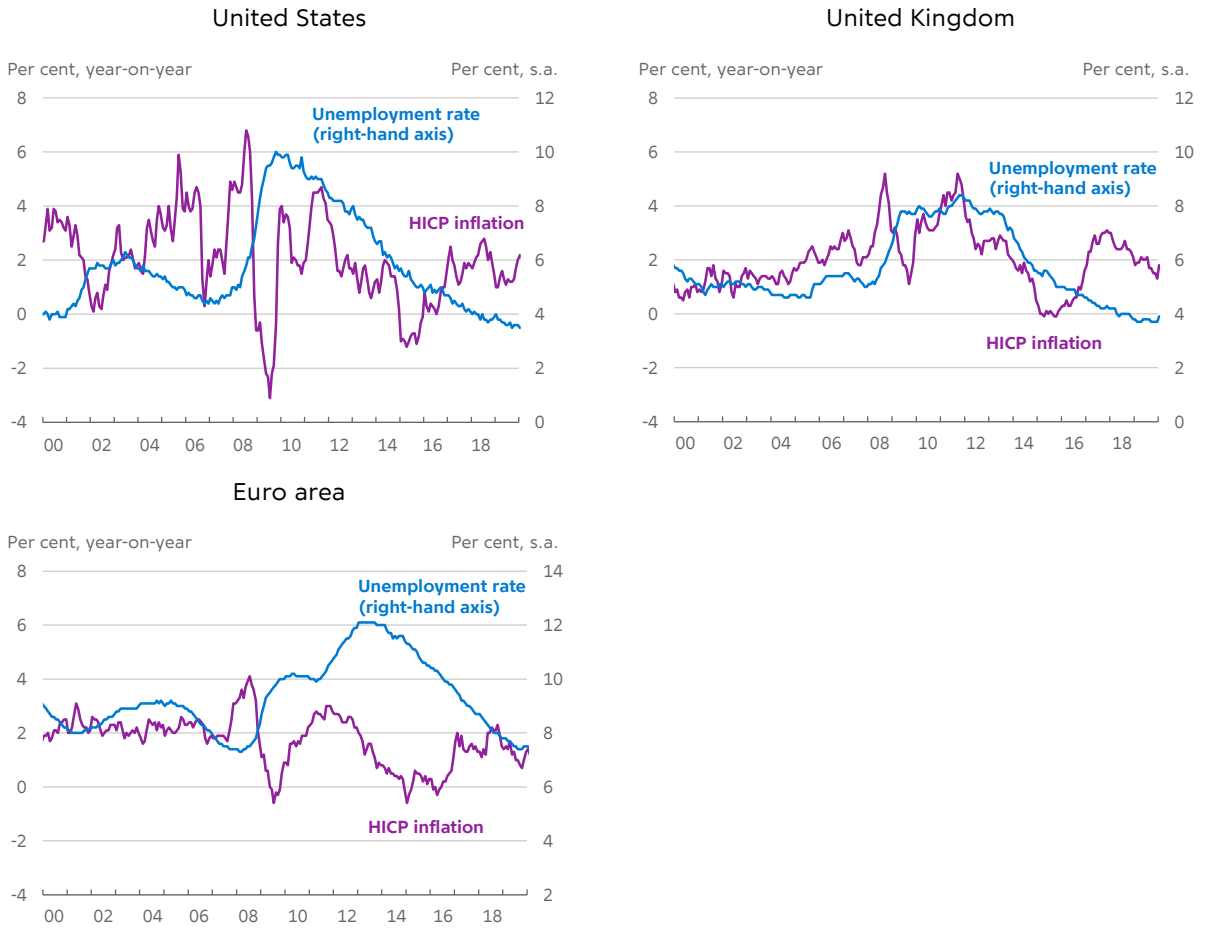
[1] Kristoffersen (2018) notes that in Denmark the employment gap, which combines both the unemployment gap and the labour force gap, explains inflation better than the unemployment gap alone. In what follows we will discuss the role of alternative measures of slack considered in the literature.

[2] See, among others, Yellen (2017) for the US, Haldane (2019) for the UK and Koester et al. (2021) for the euro area.

[3] The increasing wage growth should be seen in connection with the postponed wage negotiations in 2020 due to covid-19, which technically pushed up the annual wage growth in 2021Q2, see Dansk Arbejdsgiverforening (2021).

The recent decade's disconnect between inflation and unemployment rates is an international phenomenon

Chart 2



Note: Unemployment consists of people without a job who have been actively seeking work in the last four weeks and are available to start work within the next two weeks (ILO definition).
Source: Macrobond and Eurostat.

in expansions.[4] Nonetheless, it indicates that the on-the-job search rate may potentially increase in Denmark too.

The international disconnect between inflation and unemployment after the Great Recession

The disconnect between inflation and unemployment rates over the decade that preceded the pandemic recession is not just a Danish phenomenon. Chart 2 shows that also in the US, realised inflation remained persistently below the 2 per cent medium-term objective in that period, despite the unemployment rate reaching a 50-year low. Similarly, price inflation remained well below the 2 per cent target in the euro area, despite the unemployment rate reaching in March 2020 the lowest value attained since 1991, when the time series for unemployment rates became available. Chart 2 shows the same picture for the UK, where price inflation reached values close to zero as early as 2015. Inflation rose then again due to the exchange rate depreciation in the wake of the Brexit referendum and other factors that appear to be common among the countries reported in Chart 2. Finally, by the end of the sample, inflation fell back

[4] The quit rate for the US economy can be downloaded at https://fred.stlouisfed.org/series/JTSQUR. Faccini, Melosi and Miles (2022) show that the increase in the rate at which employed workers changed jobs during the pandemic recovery has contributed to higher price inflation in the US.

below the 2 per cent target. These low rates of price inflation were observed in the UK despite the unemployment rate also reaching very low levels, given the historical experience.[5]

After a series of forecasting errors that led the Federal Reserve to repeatedly overpredict inflation, Yellen (2017) correctly anticipated that the standard models employed by central banks would overlook some factor that would restrain inflation in the coming years despite solid labour market conditions. Specifically, she noted that labour market slack is a difficult concept to measure in the data. It should be thought of as a multifaceted concept that reflects more than just unemployment. However, it is not firmly understood yet which are the key labour market features beyond unemployment that matter for inflation.

The persistently low rate of inflation experienced in the US in spite of a hot labour market was a key input into the FED's monetary policy strategy review, which ultimately led to a major shift in the conduct of monetary policy. It resulted in the FED adopting an asymmetric view of employment, which would see a weak labour market as a problem in its own right, but a strong one as a concern only if it really pushed inflation up.[6]

In the next sections, we will explore a candidate explanation for the disconnect between unemployment and inflation, searching for a missing element in standard models of inflation dynamics that was responsible for the persistent deflationary pressures that preceded the pandemic recession. This missing factor is one that will put employed workers at the centre stage of a new measure of labour market slack.

Unemployment rates vs employment-to-employment rates: a theoretical background

The idea that the labour market matters for price inflation rests on the fact that labour income is about two thirds of gross value added, and therefore labour costs must constitute a significant source of firms' costs. In standard models, changes in all marginal costs are ultimately passed through to final goods and services. This explains why economists generally focus on the behaviour of wages when trying to understand price inflation.[7]

The tenet that the unemployment rate matters for wages goes back at least to Phillips (1958). The rationale is that the unemployment rate measures the scarcity of labour, and thus should be inversely related to its price, i.e. the wage. Over time, the original relationship between unemployment and wage inflation (the Phillips Curve) has been modified to accommodate broader measures of labour market slack. For instance, different studies have emphasised the importance of other labour market variables, such as short-term unemployment (Krueger et al., 2014), underemployment, involuntary part-time work and discouraged workers (Blanchflower and Levin, 2015).

The evidence for the US is that the relationship between unemployment and inflation started to fade at the turn of the new century, or perhaps the decade before, and has then broken down most dramatically over the past decade.[8] In Denmark too, this relationship seems to have weakened starting in the 1990s, when a series of labour market reforms drove down structural unemployment, i.e. the level of unemployment associated with stable wage and price developments.[9] As a result, the unemployment gap has since been considered as a more accurate measure of inflationary pressures in the labour

[5] The unemployment rates shown in Chart 2 are based on survey measures. The unemployment rate for Denmark in Chart 1 is computed based on the number of registered unemployed workers, i.e. persons claiming unemployment benefits, or recipients of social assistance deemed ready to work. The takeaway form Chart 1 would not change using a survey-based measure of unemployment rates. However, we use the claimant count measure to compute the time series of slack in Chart 5.

[6] See Powell and Wessel (2020).

[7] See Hviid and Renkin (2020) for an analysis of how labour costs are passed through to prices in Denmark.

[8] Hazell et al. (2021) estimate that the slope of the price Phillips curve falls by a factor of 2 in the US after 1990. Moscarini and Postel-Vinay (2017) show that after 2000 in the US, the unemployment-to-employment transition rate, which is highly correlated with the unemployment rate, loses statistical significance in explaining wage growth, while employment-to-employment transition rates have strong predictive power. Kristoffersen (2018) finds evidence of a weakening of the Phillips curve in Denmark starting in the 1990s. Storgaard (2011) finds weak evidence for the existence of a traditional Phillips curve in Denmark.

[9] See Finansministeriet (2014).

market.[10] However, since the Great Recession, even the unemployment gap has failed to explain the subdued wage inflation observed in Denmark.

The idea that we explore in this memo emphasises the importance of the search behaviour of employed workers, in contrast with the traditional view focusing on the search behaviour of the unemployed. After all, in any advanced economy, employed workers account for about 90 per cent of the workforce or more, so it is reasonable to assume that their behaviour should have important implications for wage formation.[11]

A piece of evidence suggesting that the search behaviour of the employed could be potentially relevant for wage inflation is provided by Faberman and Justiniano (2015). They first showed that the quit rate, i.e. the share of employed workers who quit their jobs at a given time, tends to track remarkably closely the behaviour of wage inflation. Specifically, the quit rate tends to increase when inflation rises and vice versa. Similarly, Moscarini and Postel-Vinay (2017) have shown that the share of workers who change employers in a given period, the so-called employment-to-employment rate (EE), is better at explaining inflation than the share of unemployed workers who find jobs. The EE rate and the quit rate tend to vary in very similar ways over time. This is because most of the workers who quit their jobs move to another job with a different employer, and very few of them become unemployed. So, the quit rate largely reflects EE transitions.

The reason why EE and quit rates should move in the same direction as wage inflation is not obvious, and may even appear surprising. Indeed, according to basic economic principles, one would expect that a higher propensity among employed workers to search for new jobs would expand the intensity of labour supply, causing wages to fall.[12]

A possible explanation for why higher search intensity on the part of the employed could put upward pressure on wage negotiations rests on the idea that by obtaining a job offer, employed workers can induce wage competition between their current employer and the new candidate one.[13] The firm that intends to poach the worker from their current firm has to offer a sufficiently attractive position, including better wages, to make the offer attractive, and if a worker is particularly valued by her own employer, she may end up getting the pay rise that is necessary to retain her in her current job. So, an employed worker can, by searching for new job opportunities, play two firms against each other and spark competition between them for her own benefit, which may likely result in a higher negotiated wage. This is not an option for the unemployed, unless they manage to attract multiple offers.

In this context, the propensity of employed workers to search for new jobs matters for wages. If workers search more, they induce more wage competition between employers, leading to an increase in inflationary pressures; if they search less, wage competition and inflationary pressures also fall.

Empirical evidence on the search behaviour of employed workers

Is there evidence that workers have been less actively searching for jobs over the last decade?

The left panel in Chart 3 shows the employment-to-employment (EE) transition rate in the Danish economy since the start of the century. This rate measures the number of workers changing employers in a given period, over the total number of employed workers. The purple line uses monthly

[10] See Kristoffersen (2018).

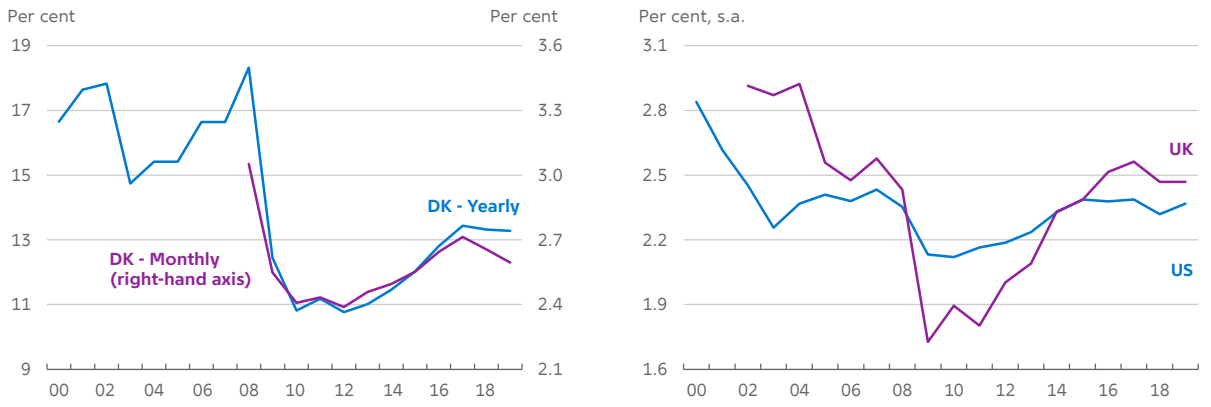
[11] This shift of emphasis from the role of the unemployed to the role of the employed job seekers in explaining wage and price inflation was first advocated by Moscarini and Postel-Vinay in a series of pioneering contributions, see Moscarini and Postel-Vinay (2016a, 2017 and 2019). Faccini and Melosi (2020) provide the first quantitative analysis of the ability of structural models à la Moscarini and Postel-Vinay (2019) to explain inflation dynamics.

[12] All else being equal, an increase in the number of employed workers searching for jobs or an increase in the number of unemployed job seekers have the same implications in standard economic models, which is to reduce the negotiated wages by increasing the intensity of labour supply (see Abraham et al., 2020). However, this conventional hypothesis fails to explain the low inflation observed at the end of the second decade (Faccini and Melosi, 2020).

[13] See Moscarini and Postel-Vinay (2017) for empirical evidence using US data.

Employment-to-employment transition rates have fallen both in Denmark and in other countries

Chart 3



Note: The left panel shows the share of wage earners that have an employment-to-employment transition in Denmark using yearly and monthly data from the IDAN and BFL registers, respectively. For DK – Monthly, it shows the average monthly employment-to-employment transition rates, where an employment-to-employment transition is defined as a change in firm identifiers between the current and previous months. For DK – Yearly, an employment-to-employment transition is defined as a change in firm identifiers between November of the current and previous years, conditional on zero unemployment during the year. The growth rate of the yearly employment-to-employment transition rate is set to zero in 2005 and 2007 due to structural breaks in the data. For a further description, see Box 1. The right panel shows the share of employed persons that have an employment-to-employment transition in the UK (aged 16 to 69 years) and the US.

Source: For Denmark, own calculations based on register data from Statistics Denmark. For the UK, the data are from the Office for National Statistics.[14] For the US, the data are based on calculations by Fujita, Moscarini and Postel-Vinay (2021).[15]

data, which are only available since February 2008. The blue line instead uses yearly data, but goes further back in time. Both time series point to the same picture: EE rates have fallen markedly after the 2009 recession, and by the end of the second decade they still had not got back to the average experienced prior to the Great Recession. The right panel of the same chart illustrates the behaviour of the EE flow rate for the US and the UK. A similar picture is seen, whereby EE rates fell to a historical low after the Great Recession, and then remained below the average experienced before that recession.

Further, data on employment-to-employment transition rates have been collected for European countries by Eurostat starting only in 2011, so they do not allow comparisons of average rates in the first and second decades or measurements of the extent to which they likely fell during the Great Recession. However, the data reveal that for major European countries such as Italy and France, and in other Nordic countries like Norway, Sweden and Finland, EE rates have failed to pick up over the recovery. This is anomalous behaviour, given that EE rates typically rise with economic activity, and with the associated increase in the more widespread availability of job opportunities. In turn, this suggests a lower propensity of the employed workers to search on the job and less inter-firm wage competition towards the end of the decade.[16]

Indeed, the low EE rates recorded before the start of the pandemic recession across most advanced economies are even more striking in light of the record low unemployment rates experienced in these same countries. Times when unemployment rates are extremely low tend to be also times when firms find it

[14] The UK employment-to-employment transition rates are available at https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/labourforcesurveyflowsestimatesx02.

[15] The US employment-to-employment transition rates are available at https://sites.google.com/view/shigeru-fujita/data.

[16] Eurostat employment-to-employment transition rates are available at: Statistics | Eurostat (europa.eu)

hard to recruit workers, and finding jobs is relatively easier. If finding jobs has become easier by the end of the second decade, but employed workers do not transition to new jobs at higher rates, then it is likely that they have been searching less.[17]

Faccini and Melosi (2020) develop a methodology that uses employment-to-employment and unemployment rates to deduce an implied time series for the average share of employed workers searching for jobs. Using this methodology, the on-the-job search propensity increases if the employment-to-employment rate rises faster than the unemployment rate falls (and vice versa). This methodology also accounts for the fact that EE rates would naturally fall, as workers tend to move to more productive jobs during a recovery.[18] They show that in the US, the share of workers searching on the job has been steadily falling over the second decade, with no sign of reversal.[19]

We note that the approach in Faccini and Melosi (2020) relies on a large number of simplifying assumptions, which must have some implication for the quantitative results. For instance, it is assumed that firms can compete to attract employed workers only by offering higher wages. In practice, we know that there are many factors that could make a job attractive, other than wages. Further, it is assumed that the share of workers who lose their jobs is constant over time, whereas we know that relatively more workers are made redundant during recessions. It is assumed that the size and skill mix of the labour force are constant, whereas regulations, migration and demographics naturally change the skill mix of the employed vs the unemployed. In turn, this may impact the rate at which firms hire from unemployment relative to employment. It is also assumed that workers have the same productivity in a job, independently of whether they have just been hired, or they have been working in a position for a long time.

For the US, direct survey evidence is available on the job search behaviour of employed workers, starting from 2014. This survey points to a steady fall in the propensity of workers to search on the job. Faccini and Melosi (2020) show that the share of employed job seekers, estimated using their methodology, follows this survey evidence remarkably closely. So, despite the many simplifying assumptions embedded in the model, its implications for the search behaviour of the employed align well with direct empirical evidence.

The authors develop a generalised indicator of labour market slack, which also accounts for the inflationary pressures generated by the search behaviour of employed workers, over and above the role played by the unemployed, see Box 2. They show that the fall in the share of employed workers searching for jobs more than compensates for the fall in the unemployment rate, inducing deflationary pressures in the US labour market over the years preceding the pandemic recession. Given the simplifying assumptions of the model, the labour market slack measure in Faccini and Melosi (2020) does not aim to explain the many ups and downs exhibited by wage and price inflation from one year to the next. Rather, the goal is to identify the presence of a significant source of long-term inflationary (or deflationary) pressure coming from the behaviour of the employed workers that would

[17] There may, of course, be alternative explanations as to why a fall in the unemployment rate does not necessarily reflect an increase in available job opportunities. It could be that the composition of the labour force changes, because of migration or labour market reforms. As discussed later in more detail, increasing migration and an expansion of the labour force due to previous reforms may have induced a fall in unemployment for a given propensity of the employed to search for jobs.

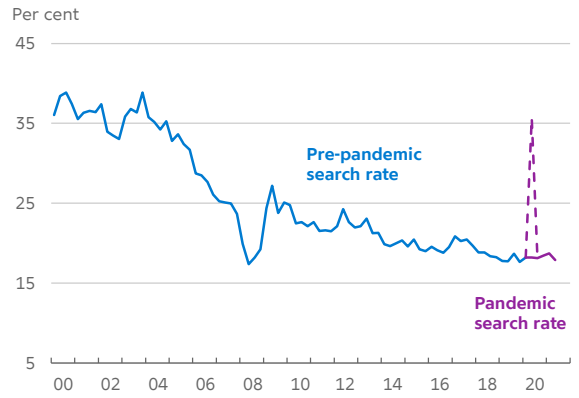
[18] The intuition about how the rate of on-the-job search is pinned down by the joint behaviour of unemployment rates and EE rates is as follows. The unemployment rate proxies for the arrival rate of job opportunities, both for unemployed and employed job seekers. At times of low unemployment, both the unemployed and the employed are more likely to receive job offers, provided that they search for jobs. If EE rates do not increase when unemployment falls, it must be a sign that either the employed are searching less, or they do not need to change jobs because they are already employed in good jobs. Given some assumptions on an initial distribution of high and low-productivity jobs, and on the chances of finding better matches, the model can track the implicit evolution of the share of high-productivity job matches (see Box 2).

[19] These results align well with those in Moscarini and Postel-Vinay (2016b), who show that the typical employment-to-employment transition pattern, whereby workers employed in small businesses tend to move to larger and more productive firms after recessions, broke down in the US after the Great Financial Crisis.

be overlooked by focusing only on unemployment rates and unemployment gaps.

We replicate their analysis on Danish data and report the main results in Charts 4 and 5. Chart 4 shows that the share of employed workers searching for new jobs has been steadily falling in Denmark since the beginning of the century, dropping from an average of around 35 per cent per quarter to about 20 per cent before the start of the pandemic recession. The most recent values estimated for the Danish economy are somewhat lower than those measured in the US surveys, where after 2014 the share of employed job seekers has averaged around 20 per cent per month, rather than per quarter. The behaviour of the share of workers searching on the job during the pandemic recession is denoted by the purple colour. We will comment on it below in a section dedicated to the analysis of inflationary pressures in the most recent times.

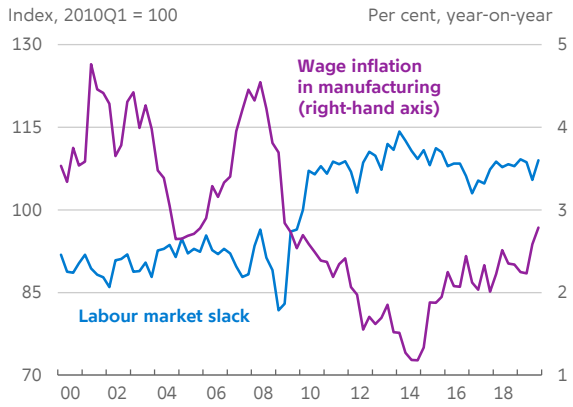
On-the-job search has declined in Denmark Chart 4



Note: Quarterly share of wage earners searching for new jobs. This measure is a model concept based on Faccini and Melosi (2020). The dashed purple graph reflects the estimated on-the-job search rate during the pandemic recession, whereas the solid purple graph assumes a constant rate between 2020Q1 and 2020Q2 due to a potential measurement error as explained in footnote 28.
Source: Own calculations (see Box 2) and Statistics Denmark.

The fall in the estimated share of workers searching on the job implies that Danish firms have been competing less often to recruit employed workers, implying lower wage growth. Further, a fall in the propensity of the employed workers to search for new jobs has implications for productivity; if workers search less, they will have less opportunities to move to jobs where they could be more productive. If workers tend to be employed, on average, in jobs with lower productivity, their bargaining position will be weaker when negotiating with prospective employers. Quite clearly, a prospective employer needs to offer higher wages to be able to successfully poach a worker employed in a high-productivity job, compared to a situation where the same worker is employed in a low-productivity one. So, if the employed workers search less, they will also move less frequently to jobs with higher productivity, which in turn reduces aggregate productivity and wages.

New measure of generalised labour market slack predicts subdued wage inflation in Denmark Chart 5



Note: Measure of generalised labour market slack based on Faccini and Melosi (2020), see Box 2. It can be thought of as the probability that wage negotiations with a prospective employee do not end with very expensive agreements.
Source: Own calculations and Statistics Denmark.

The generalised measure of labour market slack developed by Faccini and Melosi (2020) takes all these factors into account, as well as the direct role of the unemployment rate as a source of slack. The estimated generalised measure of slack for the Danish economy is plotted in Chart 5. It gives an overall picture that is radically different from the one that emerges looking only at unemployment rates, cf.

Chart 1. Labour market slack exhibits a marked rise in the immediate aftermath of the Great Recession, and then appears to stabilise at relatively high values. The big picture emerging from Chart 5 is that inflation tended to be high when slack was low, and it tended to be low when slack was high.

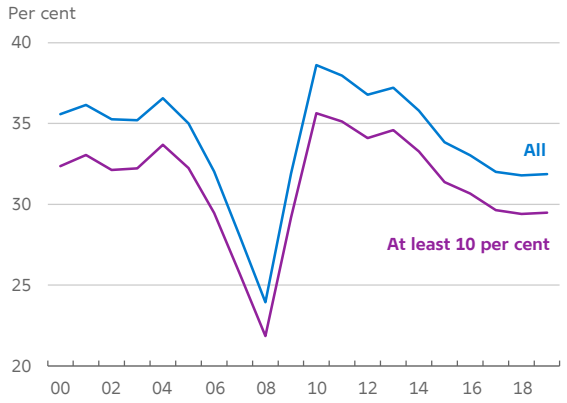
Why have employment-to-employment transitions fallen?

The fall in employment-to-employment rates is, to a large extent, an international phenomenon, which could help explain the generalised deflationary pressures observed across advanced economies, but what could possibly explain this? There could be many reasons why these transition rates have fallen. We do not aim to provide a solution, but to review possible explanations.

An interesting hypothesis put forward by Haldane (2019) is that the Great Recession may have scarred risk appetite, discouraging employed workers from quitting their jobs to reach for better opportunities. The underlying idea is that changing jobs carries a higher risk of becoming unemployed, given the uncertainty associated with the quality of the new match. Haldane's hypothesis is that workers may have become more averse to such risks. Another possible explanation for the fall in workers' propensity to search on the job is that the actual risk associated with becoming unemployed has increased, rather than the appetite towards that risk. In Denmark, the cut in the duration of unemployment benefits in 2010 and the decrease in 2013 in social assistance to young unemployed persons without an education could have contributed to that.

Unemployment prospects can also worsen if economic turbulence increases. That is, if unemployed workers experience a larger drop in wages upon finding new jobs.[20] Chart 6 excludes this possibility, though. In Denmark, the fraction of unemployed workers experiencing a decline in wages (or a decline of at least 10 per cent) upon re-employment was, if anything, lower in the run-up to the pandemic recession than it was prior to the Great Recession.

Wage cuts following unemployment have not become more common... Chart 6



Note: Yearly share of inflows to employment that are associated with a decline in labour income compared to the last time the wage earner was employed. An inflow is defined as being a wage earner in November of the current year but not the previous one. For a further description, see Box 1.
Source: Own calculations based on Danish register data from Statistics Denmark.

Another candidate explanation for the fall in EE transitions, also mentioned by Haldane (2019), is that perceived income insecurity may have risen, and particularly so after the Great Recession. If the last person hired is the first to be fired, workers may feel less inclined to leave their jobs in search of new, risky opportunities at times where the probability of being fired is perceived to be higher.[21]

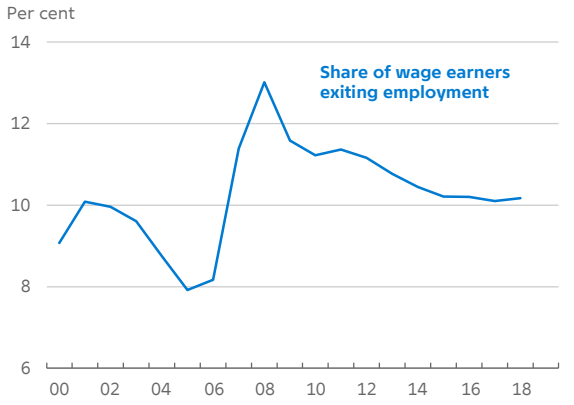
Chart 7 shows that the share of workers who transition from employment to non-employment has been higher during the recovery that followed the Great Recession, compared to the period of expansion that preceded it. Although these data cannot distinguish between voluntary job terminations and firings, they are not inconsistent

[20] The concept of economic turbulence was first introduced in the seminal paper by Ljungqvist and Sargent (1998).

[21] This is likely to be the case given that the experience that workers acquire on the job is valuable for the employers. Moreover, the notice period typically increases with job tenure, making firing more expensive.

with the hypothesis of increased job insecurity after the Great Recession.[22]

... but the probability of exiting from employment has increased Chart 7



Note: Yearly share of wage earners exiting employment in Denmark. An exit is defined as being a wage earner in November of the current but not the subsequent year. For a further description, see Box 1.
Source: Own calculations based on Danish register data from Statistics Denmark.

The fall in the propensity of employed workers to search for new jobs could also be driven by changing demographics. Older workers are typically less inclined to search for new jobs opportunities, so the aging of the workforce could have contributed to the reduction in EE rates (Engbom, 2019). Alternatively, the fall in EE rates could reflect the nature of work becoming increasingly specialised over time, shrinking the set of alternative jobs available to employed job seekers. Other structural transformations in the labour market could also have affected worker flows between jobs. There is robust evidence that in advanced economies jobs that involve performing routine tasks have been gradually disappearing, being replaced by non-routine types of occupations of either manual or abstract nature. It may be that the fall in EE rates reflects the discouragement of workers who have been re-employed in very different jobs and realise they have no chances of getting back to their original occupation.[23]

Another possibility is that EE transition rates may have fallen because, with better information technologies, workers are quicker at finding jobs that are a good match, and therefore have fewer incentives to search. Moscarini and Postel-Vinay (2016b) show that after the Great Recession, US workers became stuck in low-productivity jobs, and the reallocation to better matches usually seen after recessions seemed to break down. So, the US experience does not seem to support this hypothesis.

Little is known yet about what drives the decision to search on the job, also owing to the severely limited availability of data about on-the-job search behaviour. The addendum to the Survey of Consumer Expectations administered by the Federal Reserve Bank of New York contains the most detailed information to date on the search behaviour of the employed, but the collection of data only started in 2014. It is likely that over the coming years, the availability of more and better data from this survey will help shed further light on what drives the decision to search on the job.[24]

Other potential explanations for the subdued inflationary pressure in the recent decade

While this analysis focuses on the role of on-the-job search in explaining the subdued inflation rate experienced in Denmark and other advanced economies over the second decade of this century, other explanations have been proposed which may also have merit. For instance, it could be argued that while this analysis focuses on unemployment rates, what really matters for inflation are unemployment gaps. A fall in the rate of unemployment does not necessarily indicate an increase in inflationary pressures if structural unemployment also falls. While structural unemployment has been falling over the

[22] When assessing the risks related to job insecurity, workers should also take into account how easy it is to find jobs upon becoming unemployed. If job opportunities become increasingly abundant for unemployed job seekers, an increase in the probability of losing a job should not necessarily make workers more reluctant to change jobs.

[23] For evidence on job polarisation for the US economy, see Jaimovich and Siu (2020) and references therein. For evidence on euro area countries, see Siena and Zago (2021). The latter also explores the implications of job polarisation for the flattening of the Phillips Curve.

[24] For one of the most recent and insightful studies on this issue, see Faberman et al. (2021).

course of the second decade in many advanced economies, it is generally believed that this explanation alone cannot explain the low inflation observed towards the end of that decade, which is genuinely puzzling.[25]

Another potential explanation for the moderate growth in wage and price inflation in Denmark is the attitude of unions and companies, which have favoured low wage inflation in renegotiating wage agreements so as to protect employment. Another popular explanation is the increased inflow of cheaper labour from European countries. Both the behaviour of unions and the increase in migration flows may certainly have contributed to the moderate wage growth observed in Denmark. It could also be argued that in the context of the Danish economy, these deflationary pressures may stem from the fixed exchange rate between the Danish krone and the euro, given the low inflation experienced by the euro area. Indeed, two countries linked by a fixed exchange rate are bound to experience the same rate of inflation in the long run. However, the fixed exchange rate, the increase in net migration flows and the role of unions are quite specific to the Danish experience and do not apply to other countries like the US and the UK.[26] Since the fall in both inflation and unemployment rates is a phenomenon observed across many developed countries, it is unlikely that its explanation is rooted in a collection of country-specific events.

Since falling inflation has been an international phenomenon, it is tempting to relate its source to a global force that affects all advanced countries at the same time. The most obvious candidate explanation of this sort is globalisation, which affects all countries through falling production costs. However, a voluminous literature, summarised in the ECB strategic review, has concluded that global variables have limited ability to improve our understanding of the dynamics of the underlying, slow-moving inflation trend, and they do not appear to have become more important over the past decade.[27]

The alternative idea pursued in this analysis is that conventional indicators of labour market tightness have been providing imperfect signals. Instead, the role of employed job seekers in affecting wages appears to be promising in explaining wage and price inflation dynamics over the medium term, given that it seems to offer a broadly consistent picture across advanced economies.

Labour market slack in the pandemic recessions and implications going forward

So far, we have been investigating the relationship between labour market slack and inflation, focusing on the developments observed between the first and the second decades of the century. But how has labour market slack evolved over the pandemic recession?

Chart 8 shows the behaviour of labour market slack in recent years. In 2020Q2, at the very beginning of the pandemic, slack falls but then subsequently reverts to values that are similar to those measured prior to the recession. The initial fall in slack is driven by the sharp increase in the share of employed job seekers, depicted by the dashed purple line in Chart 4, which likely reflects a measurement error.[28] In the following quarters of the recession though, the share of employed job seekers in Chart 4, and the measure of slack in Chart 8, tend to revert to similar levels

[25] See Yellen (2017) for a general discussion in the US context, and Faccini and Melosi (2020) for empirical evidence on this matter. See Kristoffersen (2018) for similar arguments about the Danish economy. For estimates of structural unemployment, see Hristov et al. (2017) for the euro area. The Office for Budget Responsibility reports similar estimates for the UK at https://obr.uk/box/the-equilibrium-unemployment-rate/. US estimates for the natural rate of unemployment can be downloaded at https://fred.stlouisfed.org/series/NROUST.

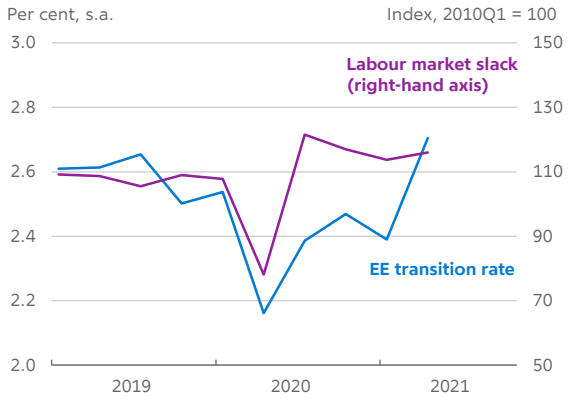
26 In the US, net migration has fallen after the Great Recession and stabilised at a lower level compared to the first decade (see https://fred.stlouisfed.org/series/SMPOPNETMUSA). In the UK, net migration has been broadly similar in the first and second decades (see https://migrationobservatory.ox.ac.uk/resources/briefings/long-term-international-migration-flows-to-and-from-the-uk/).

[27] See European Central Bank (2021) as well as work by Kamber and Wong (2018) from the BIS. The VoxEU article by Balatti et al. (2021) also offers an excellent summary of the ECB's perspective on this topic together with a review of the literature.

[28] A caveat to the data used is that a transition into a new job, both for the employed and the unemployed, is only observed when a worker starts receiving wages from a new firm. While the unemployed can, in principle, begin in a new job immediately, the employed typically face a notice period in the previous firm. This means that the pandemic-induced fall in the EE rate is observed with a lag relative to the fall in the UE rate, explaining the marked increase in the share of employed job seekers in 2020Q2.

measured before the pandemic. Thus, our generalised measure of slack suggests that the same deflationary pressures that were operating in the second decade were still active at least until 2021Q2, which is as far as we can look, given the available data.

Labour market slack has hovered around its pre-pandemic level Chart 8



Note: Quarterly share of wage earners that have an employment-to-employment transition in Denmark. For a further description, see Box 1. The measure of generalised labour market slack is based on Faccini and Melosi (2020), see Box 2. It can be thought of as the probability that wage negotiations with a prospective employee do not end with very expensive agreements.
Source: Own calculations and Statistics Denmark.

Quite clearly, the measure of slack examined here abstracts from factors that are external to the domestic labour market, such as the effects of changes in energy prices or disruptions to international supply chains. Hence, it should not be interpreted as a guide to forecasting short-term inflation, but rather as an indicator of the longer-running domestic inflationary pressures underlying trend inflation. The picture that emerges is one where the persistent fall in the propensity of employed workers to look for jobs continues to weigh down on wage and price inflation. Indeed, the rate at which workers transition from one employer to another (EE rate in Chart 8) has remained subdued after 2020, fluctuating around levels similar to those observed prior to the pandemic recession.[29]

Looking forward, inflation is likely to be driven by different forces. On the one hand, the disruption to supply chains generated by the pandemic and the rise in energy prices observed during the recovery have given rise to a tendency for the price level to increase. As of February 2022, year-on-year price inflation reached 5.3 per cent according to the Harmonised Index of Consumer Prices, and 4.8 per cent based on the Consumption Price Index. The war in Ukraine has caused further upward pressure to all energy prices. To the extent that subsequent increases in price levels feed back to inflation expectations and start to be reflected in wage negotiations, there is a risk that the rise in inflation may prove persistent. Further, the sharp fall in the rate of unemployment after the first quarter of 2021 would decrease labour market slack, even if the share of employed job seekers remained constant. This is consistent with the recently observed increase in wage and price inflation, see Chart 1. On the other hand, the EE transition rate has remained subdued throughout the post-Great Recession recovery. Seen through the lenses of our model, this finding suggests that employed workers have been less actively searching for new job opportunities. Unless employed workers increase their search intensity, the deflationary pressures experienced in Denmark and many other advanced economies over the second decade will continue to operate, dragging down on both wage and price inflation over the longer run.

There are some clear upward risks to wage inflation. As shown in Chart 1, wage inflation already started picking up in 2021Q2. If higher wage inflation induces more search on the part of the employed, there is a risk that inflation may rise even further. Moreover, a significant increase in worker reallocation may temporarily reduce aggregate productivity as the newly hired have to learn how to best discharge their responsibilities and catch up with the productivity of longer-tenured workers. In turn, such a fall in

[29] The measure of slack reported in Chart 8 depends on the level of the share of employed workers searching for jobs (see Box 2). All else being equal, a lower level of this share implies higher slack and lower inflation, in expectation.

productivity would reduce potential output, putting even more pressure on price inflation. In the US, where survey data are already available up to February 2022, a marked increase is seen in the rate at which employed workers quit their jobs. If labour market slack is indeed a multifaceted concept, where the search behaviour of the employed plays an important role, it is important to monitor its evolution over the economic recovery.

There is also a more general lesson to be learnt for the benefit of policy making which reaches beyond the case of Denmark. Setting interest rates in any inflation-targeting regime requires the ability to predict inflation over the medium term. Standard indicators of labour market tightness have been recently losing their predictive power, and hence their appeal. We hope that this memo will contribute to a line of research that, by improving our understanding of the drivers of inflation, will ultimately prove useful when it comes to offering better guidance to policy makers.

Population of wage earners in Denmark Box 1

In the analysis, labour market flows for Denmark are defined using administrative register data provided by Statistics Denmark. The main data sources are the IDAN and BFL registers. They both contain information on labour market outcomes for Danish employer-employee matches, but for different populations. IDAN covers individuals who are in the population at the beginning of the year, and whose main attachment to the labour market in November was as a wage earner, self-employed, employer or spouse-employee. In contrast, BFL covers all individuals with a reported wage income in the Danish Income Tax Register. Further, while the IDAN register is observed at a yearly frequency from 1980 to 2019, the BFL register is observed at a monthly frequency from January 2008 to June 2021.

The sample is restricted to wage earners to ensure more consistency across the two data sources. For wage earners with more than one job, the focus is only on their main job. This is achieved by restricting the sample to jobs of the type "main November employment" in IDAN, and to the job with the highest number of reported working hours in BFL.

Labour market slack and on-the-job search

Box 2

The measure of slack in Charts 5 and 8 is computed as:

$$Slack_t = \frac{u_{0,t}}{u_{0,t} + s_t(1-u_{0,t})} + \frac{s_t(1-u_{0,t})}{u_{0,t} + s_t(1-u_{0,t})} \xi_g \frac{l^0_{b,t}}{1-u_{0,t}}.$$

The term $u_{0,t}$ denotes the rate of unemployment measured at the beginning of period, and the subscript t denotes time expressed in quarterly intervals. The term s_t measures the share of employed workers who search on the job in quarter t, while $l^0_{b,t}$ measures the number of workers employed in low-productivity jobs. The parameter ξ_g captures the probability that a worker looking for a job finds a good match, i.e. a job where his productivity is relatively high. See Faccini and Melosi (2020) for a detailed exposition of the model, an in-depth discussion of the above condition and for its derivations.

In the model, $Slack_t$ measures the probability that a vacancy is matched with a "cheap" worker. The measure of slack in the equation above depends on the behaviour of three variables: the rate of unemployment, $u_{0,t}$, the share of employed workers searching on the job, s_t, and the share of low-productivity jobs $l^0_{b,t}$. It can be shown that slack increases with the rate of unemployment. Intuitively, the unemployed represent a cheap pool of workers; given that they are not employed, they do not have a salary to anchor their wage negotiations, so their bargaining power is low. It can be shown that slack falls with the share of employed workers looking for jobs, i.e., the labour market becomes tighter when more of the employed look for jobs. The intuition, explained also in the main text, is that by obtaining an offer from another firm, workers can get a salary rise, either with their own employer or with a new one. Indeed, employed workers are more expensive than the unemployed, because they can use their current wage as a basis for salary negotiations. However, workers employed in low-productivity jobs are relatively cheaper to hire. The intuition is that workers who are not well matched have low bargaining power, and therefore are easier to poach at a lower wage. Hence, they also represent a relatively cheap source of labour. This explains why slack increases in the share of low-productivity jobs $\frac{l^0_{b,t}}{1-u_{0,t}}$.

The values for $u_{0,t}$, $l^0_{b,t}$ and s_t in the above expression can be obtained based on data on unemployment rates and EE rates. Let u_t denote the rate of unemployment at the end of the period, and measured in the data. Then $u_{0,t} = u_{t-1} + \delta(1-u_{t-1})$, where δ is a parameter denoting the separation rate from employment to unemployment. Given $u_{0,t}$ and u_t, the probability that an unemployed worker finds a job, ϕ_t, can be retrieved from the equation $u_t = u_{0,t}(1-\phi_t)$.

The share of employed job seekers can be obtained from the following equation, which follows from the definition of the EE transition rate in the model,

$$s_t = \frac{EE_t(l^0_{b,t} + l^0_{g,t})}{\phi_t[l^0_{b,t}(\xi_b \nu + \xi_g) + l^0_{g,t}\xi_g \nu]}.$$

For an initial condition on good and low-productivity matches, a value for ϕ_t, the rate of the employment-to-employment transition rate measured in the data and parameter values for ξ_g, $\xi_b = 1-\xi_g$, and ν, it is possible to initialise the time series for s_t. Subsequent values for this time series can be obtained by iterating on the laws of motion for good and low-productivity jobs:

$$l^0_{b,t+1} = (1-\delta)[(1-s_t\,\phi_t\xi_g l^0_{b,t}) + s_t\,\phi_t\xi_b u_{0,t},$$

$$l^0_{g,t+1} = (1-\delta)[(1-s_t\,\phi_t\xi_g l^0_{b,t}) + s_t\,\phi_t\xi_b u_{0,t}.$$

We have assigned the following parameter values: δ=0.02569, based on the average quarterly flow rate from employment to non-employment measured in the microdata; ν=0.5, based on the assumption that workers who are indifferent between two jobs are equally likely to be employed in one or the other; a probability of finding a good match of $\xi_g = 0.66$, to match a share of good jobs in the economy of 68 per cent. Low and high-productivity jobs are initialised at 0.2975 and 0.6338, respectively, based on steady-state calculations.

The computation of EE transition rates in the data is carried out at monthly frequency. A quarterly series is obtained by taking the averages of the monthly rates from the BFL register from April 2008 onwards, and linearly interpolating backwards using growth rates of the yearly employment-to-employment transition rates obtained from the IDAN register.

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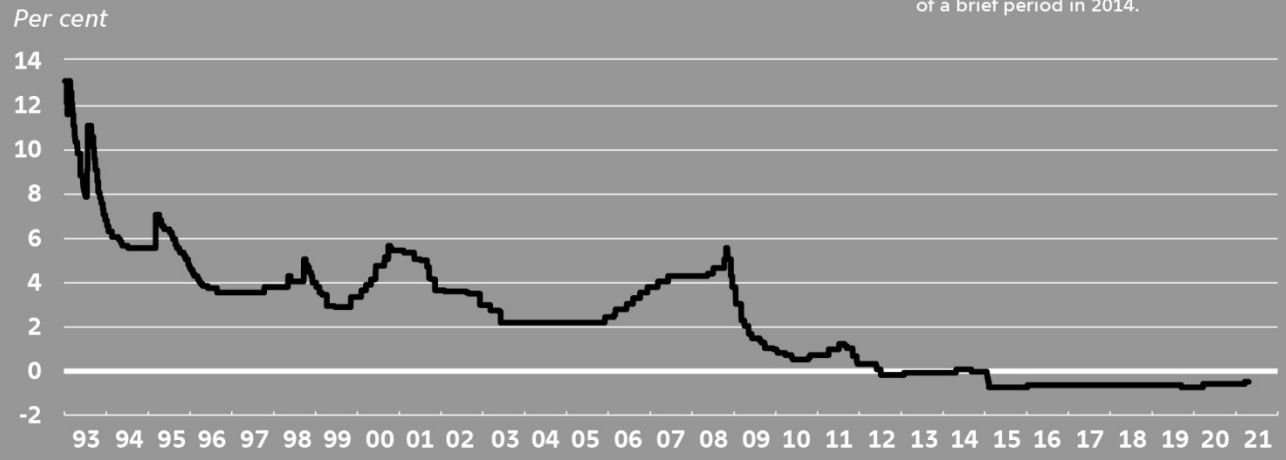

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