The margin of spare capacity in the economy is an important determinant of inflation at any given time. When a portion of the factors of production are unutilised, firms can step up production, for instance, without needing to increase overtime or add extra shifts that inevitably raise production costs - and ultimately, output prices. In this case, there is spare capacity, or a slack, in the economy (sometimes called a negative output gap); i.e., actual output falls short of potential output. Spare capacity is generally accompanied by a slack in the labour market. Unemployment is unusually high, and employers can hire more workers without having to raise wages, labour unions have more difficulty forcing wage increases because of their relatively weak bargaining position. There is always some unemployment, however, independent of the business cycle; for instance, because workers move, decide to change jobs, or take time to find a new job. For this reason, it is important to estimate how much unemployment exceeds the level that can be explained by changes in workers' personal situation and by structural changes in the economy, where some sectors grow and others shrink. This level is sometimes referred to as "frictional" unemployment, "natural" unemployment, or equilibrium unemployment.

Other things being equal, when measured unemployment is below its equilibrium value, the resulting tension in the labour market will lead to increased wage pressures, which surface as increased inflation. If unemployment is above the equilibrium level, there is a slack in the labour market, which contains wage pressures and reduces inflation, other things being equal. As a result, estimating equilibrium unemployment plays an important role in the assessment of the inflation outlook and the formulation of monetary policy.

#### A new estimate of equilibrium unemployment in Iceland

The fact that this equilibrium unemployment level can change over time complicates the matter. There are several methods used to estimate it.<sup>1</sup> In a recent study, Bjarni G. Einarsson and Jósef Sigurdsson (2013a) attempt to estimate equilibrium unemployment and identify its principal determinants (see also Einarsson and Sigurdsson, 2013b). Two methods are used in the assessment, both of them based on the relationship between unemployment and inflation: the so-called Phillips curve. The first method assesses this relationship using a regression analysis and an iteration method, where the equilibrium level of unemployment is derived from the relationship between inflation and unemployment. The latter is based on the Kalman filter, where equilibrium unemployment is estimated directly and particular account is taken of the possible effects of supply shocks on the relationship between inflation and unemployment (and their impact on the equilibrium level of unemployment). The estimates are shown in Chart 1. As can be seen, the estimated equilibrium level of unemployment correlates broadly with measured unemployment, although the former fluctuates less than the latter. Equilibrium unemployment appears to have spiked in the wake of the economic contraction in the early 1990s, rising to about 4-41/2%. It seems to have tapered off again and then risen once more after the 2008 crisis, peaking at 51/2-7% in mid-2011, depending on which method is used. It seems to have fallen back again, to just under 5% by mid-2013. According to the current baseline forecast, it will decline

### Box VI-1

## Equilibrium unemployment in Iceland



Chart 1 Unemployment and equilibrium unemployment in Iceland





Sources: Einarsson and Sigurdsson (2013a), Directorate of Labour.

#### Chart 2 Unemployment gap



<sup>1.</sup> Similarly, it is necessary to estimate the economy's potential output when assessing the magnitude of the output gap. As a result, it is sometimes argued that assessing the equilibrium unemployment level is more reliable, as it involves fewer uncertainties than an assessment of potential output. In part based on these grounds, both the US Federal Reserve Bank and the Bank of England have cited numerical unemployment levels as a reference in the formulation of near-term monetary policy.

slightly in the next few years and then hover in the  $3\frac{1}{2}-4\frac{1}{2}$ % range throughout the forecast horizon.

As Chart 2 indicates, severe labour market tension developed during the pre-crisis upswing, with unemployment far below equilibrium and both wage and inflationary pressures extremely strong. This situation reversed abruptly after the crisis struck, and by mid-2009 a considerable slack had developed in the labour market. However, according to the assessment of equilibrium unemployment, this slack had largely disappeared by late 2011 – and perhaps even earlier, according to the results generated using the Kalman filter (see also Section I).

It should be noted that estimates of equilibrium unemployment are always subject to considerable uncertainty, and even though the difference in results between the two methods reflects this to some extent, the uncertainty is actually greater. It is possible that the models used for estimation are incorrectly defined or that a structural change has taken place in the relationship between their variables. It is also possible that institutional changes in the labour market affect equilibrium unemployment. Furthermore, the relevance of the term *equilibrium unemployment* could differ between countries, depending on how interlinked their labour markets are. However, the estimates accord with findings from previous studies of equilibrium unemployment over comparable estimation periods (see the references in Einarsson and Sigurdsson, 2013a).

# The main causes of the post-crisis increase in equilibrium unemployment

There are a number of possible explanations for the post-crisis rise in equilibrium unemployment. Although labour union structure and the institutional framework of the labour market had changed very little during this period (see Central Bank of Iceland, 2012, Section 14), the period of entitlement to unemployment benefits was extended from three years to four in 2010. This could have reduced the incentive to work and contributed to an elevated equilibrium unemployment level. In addition, the increase in equilibrium unemployment can probably be attributed to the pronounced shift of capital and labour from the non-tradable to the tradable sector in the wake of the financial crisis, making it difficult for some proportion of workers to find work suited to their education and experience (see also Box IV-1 in *Monetary Bulletin* 2011/4).

Einarsson and Sigurdsson point out, however, that changes in equilibrium unemployment are caused primarily by unemployment hysteresis, and their findings explain why equilibrium unemployment tends to follow measured unemployment throughout the business cycle. Those who have been unemployed the longest often lose their connection to the labour market, as they spend less time and energy looking for work. Their skills and ability to carry out the work available could therefore diminish gradually. It could also be that firms consider prolonged unemployment a sign of poorer-quality human capital and are therefore reluctant to hire the long-term unemployed. As a result, the long-term unemployed are more at risk of becoming stuck in the jobless state, which leads to an increased equilibrium unemployment level. This is in line with Einarsson and Sigurdsson's findings, which show that long-term unemployment is accompanied by weaker wage pressures than short-term unemployment. The prolonged contraction in aggregate demand that causes elevated long-term unemployment leads to a rise in the equilibrium unemployment level.

In light of these results, it is important that the Government support efficient labour market initiatives. Initiatives that aim to pre-

serve or increase human capital, decrease labour market mismatches, and improve the efficiency of pairing unemployed persons with available jobs can reduce long-term unemployment and thus lower equilibrium unemployment.<sup>2</sup>

#### References

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- 2. See Section 5.4 in Einarsson and Sigurdsson (2013a) for a discussion of the efficiency of different labour market initiatives.