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Scarring effects of major economic downturns: the role of fiscal policy and government investment

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Abstract

Long shunned as slow and ill timed, the response to the Covid-19 pandemic initiated a reassessment of fiscal policy as stabilisation tool. At the same time, there is ample evidence that major economic downturns produce lasting effects on real GDP in spite of active fiscal policy interventions. This paper takes a fresh look at economic scarring in 26 OECD countries, including 14 EU member states, since 1970 and examines the role played by fiscal policy. We find that higher current expenditure – the favoured active response - does not mitigate the lasting impact of major economic downturns on real GDP. In contrast, more government investment could help but generally receives little attention. As a result, scarring effects are significant confronting governments with higher debt levels, which in turn weigh on the room for manoeuvre in subsequent downturns. In sum, fiscal policy makers face two difficulties in the event of a major economic downturn: (i) adopt the right type of fiscal expansion, and (ii) find the right time to pivot from short-term stabilisation to fiscal consolidation while protecting investment. Both challenges are fraught with political economy issues.

JEL codes: E60, E62, E65, H62.

Key words: Scarring effects, major economic downturn, fiscal policy, fiscal stabilisation, public investment.

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1. Introduction

In many advanced countries, the swift and forceful response to the economic consequences of the Covid-19 pandemic moved fiscal policy back into the driving seat of macroeconomic policy making. Usually characterised as slow and dominated by political motives, the size and severity of the economic shock, combined with the limited room for manoeuvre of conventional monetary policy making, gave rise to a sense of urgency and responsibility unprecedented among lawmakers in post WWII history.

Massive budgetary packages were adopted in record time first and foremost to stabilise as much as possible economic activity in the short term. The second motivation featuring in the public debate was the fear the economic impact of the pandemic could leave lasting scars, for instance via hysteresis effects in the labour market or due to persistent dents in investment.

Building on earlier work comparing post-crises output with pre-crises trends, this paper takes a closer look at the anatomy of major economic downturns in a sample of 26 advanced OECD economies, including 14 EU member states, since the 1970s.[1] The main aim is to shed light on the role played by fiscal policy. We try to establish whether a budgetary response, in particular through higher government investment expenditure, helps moderate scarring effects.

These questions may sound odd from the perspective of the Keynesian paradigm. While there is no consensus on the exact size of fiscal multipliers, there is very broad agreement that an expansionary fiscal policy will typically boost economic activity - at least in the short term - ideally back to the pre-crisis trend. At the same time, there is inescapable evidence that very often economic activity does not return to pre-crisis trends but embarks on a lower path of economic expansion. To use the language coined by time series analysts in the 1980s, real GDP does not fluctuate around a linear but a stochastic trend.

How can these two findings be reconciled? In the eyes of a Keynesian observer, long-term scars can only be explained by an erroneous or insufficient policy response. By virtue of positive fiscal multipliers, and unless shocks originate on the supply-side of the economy, the well-intentioned and well-informed policymaker should always have the ambition and ability to stabilise output. Anything else must be the result of (i) politics in the sense that lawmakers may pursue other goals; or (ii) strong hysteresis effects.

[1] Australia, Austria, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, United Kingdom. Greece, Ireland, Iceland, Italy, Japan, South Korea, Luxembourg, Mexico, The Netherlands, Norway, New Zealand, Portugal, Sweden, Turkey, USA.

Our analysis falls in between the Keynesian conviction that cyclical fluctuations can be ironed out and the bitter awareness that deeper recessions tend to produce lasting effects. Our strategy builds on and extends an approach followed by Ball (2014), Blanchard et al. (2015) and Martin et al. (2015). We first extrapolate the 'counterfactual' level real GDP would have followed in the absence of a recession and compare it with its actual course. The gap between both shows the level of scarring. We then use inferential statistical analysis to identify possible determinants of scarring, notably fiscal policy and government investment.

Our results confirm the sizeable and significant nature of scarring effects. The average annual shortfall of real GDP three to seven years after a major economic downturn is around 2% of the trend observed prior to the economic shock. Governments react on average quite forcefully to the downturn recording an increase in the budget deficit of around 3% of GDP. However, most of the discretionary expansion is centred on current expenditure while public investment remains broadly flat or even declines. As a result, the mitigating effect of fiscal policy on scarring is limited leaving governments with lower output, higher deficits and debt.

The remainder of the paper is organised as follows. Section 2 reviews the relevant literature. Section 3 characterises the behaviour of key macroeconomic variables around major economic downturns using alternative methods of identification. Section 4 estimates the average scarring effects and discusses some policy implications. Section 5 looks into possible determinants of the scarring effects by means of regression analysis. Section 6 concludes and discusses lessons for the economic crisis triggered by the Covid-19 pandemic.

2. The related literature

The notion large economic shocks may produce lasting effects preventing economic activity from returning to its original trend, has been a recurrent topic since the discussion on whether GDP has a stochastic trend or not (Beveridge and Nelson, 1981; Nelson and Plosser, 1982; Stock and Watson, 1988). Nevertheless, macroeconomic analysis has mostly focused on the properties of short-term fluctuations in time series, with less attention to the role of permanent shifts following economic downturns. Classical business cycles are seen as a succession of peaks and troughs with output moving around a smooth trend.

However, growing empirical evidence points to a disturbing regularity. In contrast to what most business cycle analyses assume, recessions are often followed by a downward shift in the level of economic activity, i.e. during a recovery economic growth does not sufficiently overshoot pre-crisis rates so as to make up for the losses incurred during the downturn. Ball (2014) finds that in industrial

countries potential output stayed below pre-crisis trends. Blanchard et al. (2015) suggest that 70% of all recessions are followed by permanent declines in the level of economic activity. Dovern and Zuber (2020) employ revisions of forecasts of potential output in the long term and find that revisions are larger than what is to be expected under the assumption of no hysteresis.

As a result of these findings, the cost of a recession is likely to be underestimated in the classical business cycle literature. Most of the empirical work inspired by Lucas (1987) finds that the welfare costs of business cycles are trivial, with losses of less than 0.05% of consumption in each period. Engler and Tervala (2018) instead introduce hysteresis in a basic New Keynesian model, where the welfare effect of fiscal policy turns positive and significant.

While much of the recent interest in hysteresis is the result of the stagnation in economic growth since the Global Financial Crisis, hysteresis rose to prominence already in the late 1980s and 90s to explain prolonged increases in unemployment in European labour markets. Models pointed to insider-outsider relations of unemployed (Blanchard and Summers, 1986), loss of human capital due to spells of unemployment (Pissarides, 1992), and a weak incentive to participate in the labour market once unemployed (Ljungqvist and Sargent, 1998). In these models, high and persistent unemployment results from frictions in the reallocation of labour after a shock hits the economy.

Other supply-side factors relate to the evolution of firm productivity. In these models, productivity must be pro-cyclical, in order for a recessionary shock to push down the trend of economic growth. Basic models assume exogenous technology shocks, and hence cannot explain fluctuations in productivity unless by making unrealistic assumptions about technological progress.

One possibility is to introduce a 'learning-by-doing' mechanism that accumulates previous shocks to productivity and makes firms adapt technology over time, as in Stadler (1990). Reifschneider et al. (2015) argue that since 2008, the stagnation of potential output is due to lagging labour productivity, mostly because of a faltering total factor productivity and to a lesser extent of slower population growth or a rise in the natural rate of unemployment. Anzoategui et al. (2016) argue that this reduction in total factor productivity was a response to the reduction in demand: calibration of a New Keynesian DSGE model with endogenous total factor productivity that allows for the costly development and addition of new technologies, shows that such a response explains about 90% of the decline in labour productivity.

Another possibility is to include endogenous R&D, as in Comin and Gertler (2006). In this type of models, firms accumulate innovation technologies with R&D for new products, and/or adopt existing technologies into products. The expected return from R&D is higher (lower) in economic booms

(downturns), thanks to the sale of new products. This additional (lower) expenditure pushes (holds back) aggregate demand. In agent-based models, Dosi, Fagiolo, and Roventini (2010), firms invest in R&D activities in response to higher (lower) sales. As a result, either technological progress or aggregate demand can drive both short- and long-run economic growth. Nonetheless, there is also evidence for innovative activities being countercyclical: crises cleanse the market of the least productive firms (Caballero and Hammour, 1994), but much depends on the entry and exit dynamics of firms.

The Global Financial Crisis shifted attention to financial factors in prolonged economic stagnation. Guerron-Quintana and Jinnai (2015) show how financial frictions limit external finance of investment and entrepreneurs must rely on demand to finance expansion, which takes more time. Guerron-Quintana, Hirano and Jinnai (2018) instead look at the role of financial bubbles on economic growth, showing that financial crises disrupt balance sheet positions of banks and firms for a long time.

Engler and Tervala (2018) is one of the few studies to look at the implications of hysteresis for fiscal policy in a DSGE model with a learning-by-doing mechanism. In this model, a cyclical change in employment can affect the level of productivity permanently, as learning-by-doing makes workers less and less apt to fulfil the job. One outcome is that the fiscal output multiplier is much larger with hysteresis, and, as a result, the public spending effect on private consumption becomes positive. [2]

Public investment can play a particular role in the set of tools available to policymakers for a number of reasons. First, productive public investment can offset some of the permanent growth declines, and raise potential growth of an economy. Investment in infrastructure is often considered to be a tool that allows economies to permanently expand production possibilities, hence contributing to a raise in potential GDP. DSGE simulations by Ganelli and Tervala (2020) shows that the welfare effect of public infrastructure investment are positive if infrastructure is sufficiently effective.

But it leads to possibly conflicting advice for policy makers, in particular for fiscal policy. There is some scepticism on the effects of public investment. Findings on the contribution of public capital to total factor productivity are not unanimous. While the initial literature suggested very high positive effects of public investment, recent studies that take account of the endogeneity of demand for public services, and account for measurement issues, typically conclude on a small positive effect, albeit there can be wide differences depending on the type of investment, the country/region and the time frame of analysis (Romp et al., 2010). Nuñez-Serrano and Velazquez (2017) run a meta-analysis on 145

[2] In many theoretical models, public spending crowds out private spending due to future tax liabilities.

papers with about 2,000 estimates of the output elasticity of public investment, and find an average long-term elasticity of about 0.16.

Finally, the benefits of government investment must be assessed against its funding by public resources. Uhlig (2010) argues that additional spending is to be financed by future distortionary taxation; hence, any fiscal expansion with a positive economic return must be weighed against the future decline in productivity. In addition, expansionary fiscal policy is likely crowding out private investment, thus raising obstacles for private investors. These factors are of course less important in a period of economic stagnation, when the economy is close to the zero-lower-bound (Benigno and Fornaro, 2017). Bouakez et al. (2020) argue that the optimal fiscal policy is precisely to boost a large and persistent increase in public investment, while public consumption should just have a small and short-lived increase when there is a liquidity trap. In this model, a rise in public investment improves the efficient allocation of production factors.

These findings obviously resonate with the literature exploring the output effects of fiscal consolidation, that is, the opposite of a fiscal expansion. The most comprehensive study in the field is by Alesina et al. (2020). They document negative output effects of expenditure cuts and tax increases in the short run followed by stronger output growth in the medium to long run thanks to positive supply side effects. They also show that the medium to long-term output effect depends on the composition and speed of the fiscal adjustment, whereby faster and more decisive cuts in current expenditure trigger stronger supply effects. These effects tend to be stronger when consolidation is not skewed towards public investment or accompanied by structural reforms.

There are also a set of accompanying policies that improve the chances of successful fiscal consolidation. Favourable monetary and exchange rate policies (Lambertini and Tavares, 2005) and contemporaneous labour and product market reform increases the chances of economic expansions (Tagkalakis, 2009) as they improve competitiveness and hence stimulate exports. The Non-Keynesian view is mostly based on the work of Alesina and Perotti (1995, 1997) and employs event studies around episodes of large fiscal consolidations, to examine the characteristics of those that are successful in promoting growth and reducing debt.

3. Stylised facts around major economic downturns

Our empirical analysis addresses three questions in the following sequence: (i) What is a major economic downturn? (ii) What is the impact of a major downturn on output in the medium term, i.e. the size of scarring? and (iii) Does fiscal policy have a systematic impact on the size of scarring?

We look at 26 OECD countries, including 14 EU member states (see Table A1 in the Annex). We use annual data starting in 1970 or whenever data starts being available. Existing studies on the lasting effect of economic downturns mostly use quarterly data. This option was not viable in our case because we intend to go beyond characterising the scarring effect on output. We seek to understand the role played by fiscal policy and in particular government investment, for which only annual data are available over a sufficiently long period of time.

Before moving to a more involved inferential statistical analysis, we sketch out the typical profile of a major economic downturn. To that end, we look at how key macroeconomic variables behave in the three years prior and following a major drop in economic activity. A commonly used method to identify recessions is the approach developed by Harding and Pagan (2002) which we adapt to annual data.[3] To check robustness, we use two less sophisticated but fairly intuitive alternatives. The first defines a major recession as a year in which real GDP growth decelerates by more than one standard deviation on the previous year. The second alternative identifies major downturns as years in which the output gap, measured by the Hodrick-Prescott filter, turns negative and is lower than - 1% of potential GDP.[4] For both alternatives we ignore episodes that follow right after another, i.e. at least one year not classified as major downturn has to occur before a new episode is identified. Contiguous years with a major economic downturn are excluded by construction by the Harding and Pagan (2002) method but can arise, although not frequently, with the two alternatives.

The results of the three methods are reported in Table 1. The output gap criterion turns out to be the most sensitive one. It detects close to 160 major downturns out of around 1,300 observations in our sample, i.e. some 12% of all country-years.[5] The Harding and Pagan (2002) method and the threshold for the standard deviation of real GDP growth identify a lower but still large number of episodes: close to 130 or around 10% of all country-years. The difference is easily explained. The output gap criterion is built around a given distance between potential and actual output. Hence, it includes cases where real GDP slows but does not necessarily drop compared to the previous year. The other two criteria, in contrast, involve thresholds for the extent of the economic downturn compared to past rates of

[3] To identify the turning points in the time series we use the algorithm developed by Bry and Boschan (1971) with a window of 1 year, minimum phase length of 1 year, and minimum cycle length of 2 years. These parameter choices closely follow the ones used in Chapter 2 of the IMF's April 2021 World Economic Outlook.

[4] Table A1 in the Annex shows the complete list of episodes of major economic downturns linked to the three methods of identification. There is a large overlap between the Harding-Pagan (H-P) method and the approach based on one standard deviation of real GDP growth. Correspondence is significantly lower with respect to the output gap approach.

[5] This number is smaller than the one reported in the annex. It is already corrected for cases within a three- year period at the beginning and the end of the country samples. The correction is done to characterise pre- and post-recession years.

growth: in the case of the Harding and Pagan (2002) method compared to a local maximum, in the case of the standard deviation compared to the average rate of growth in the sample.

Table 1: Identifying major recessions

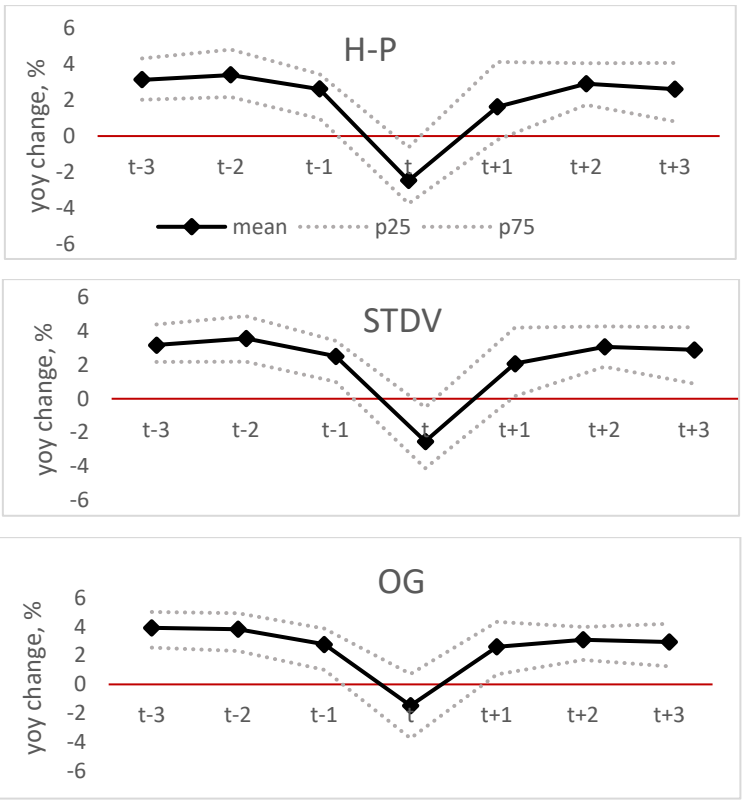
Method to identify major economic downturn	**Number of major economic downturns**	**Share of all country-years in sample**	**Average real GDP growth in the year of the major economic downturn**
Harding-Pagan (H-P)	127	10%	-2.5%
Standard deviation (STDV)	125	9%	-2.5%
Output gap (OG)	159	12%	-1.5%

Note: The number of major economic downturns is already corrected for cases within a three 3- year period at the beginning and the end of the country samples. The correction is done to characterise pre- and post-recession years. H-P: Harding and Pagan (2002) method. STDV: real GDP growth decelerates by one standard deviation or more on the previous year. OG: the output gap, obtained from an Hodrick-Prescott filter, turns negative and lower than - 1% of potential GDP. For STDV and OG we exclude episodes following immediately after another major economic downturn the year before.

Having identified three alternative sets of major economic downturns, we move to the next step of our analysis, namely characterise a typical or average profile of how economies behave around the episodes of interest. We start with output. Figure 1 shows the average rate of real GDP growth across all episodes starting three years before the economic downturn and ending three years after.

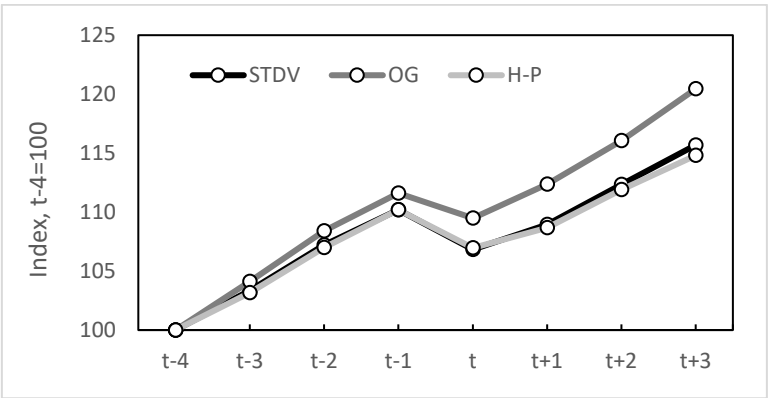
The dotted lines are the 25th and 75th percentile and offer an idea of the variability in the sample. Although the profiles differ somewhat across the three identification methods, they support the same and central messages: Economic growth goes into negative territory in the year of the downturn and rebounds in the following years. However, the rebound is fairly contained. Most importantly, economic growth does not overshoot the rates recorded prior to the recession; it actually settles at slightly lower rates. As a result, there is a downward shift in the level of economic activity. Real GDP resumes an upward trend but stays below the one recorded prior to the recession (Figure 2). Employment recovers even less than output and leaves economies with more jobseekers in percent of the labour force but higher productivity growth. These findings are very much in line with earlier studies on the medium or long-term effects of economic downturns or economic crisis such as Ball (2014), Blanchard (2014) and Martin et al. (2015).

Figures 1: Real GDP growth around major economic downturns



Note: H-P: Harding and Pagan (2002); STDV: Negative real GDP growth equal or in excess of one standard deviation of the country concerned; OG: The output gap turns negative and below –1% of GDP.

Figure 2: Real GDP around major economic downturns (index, t-4 = 100)

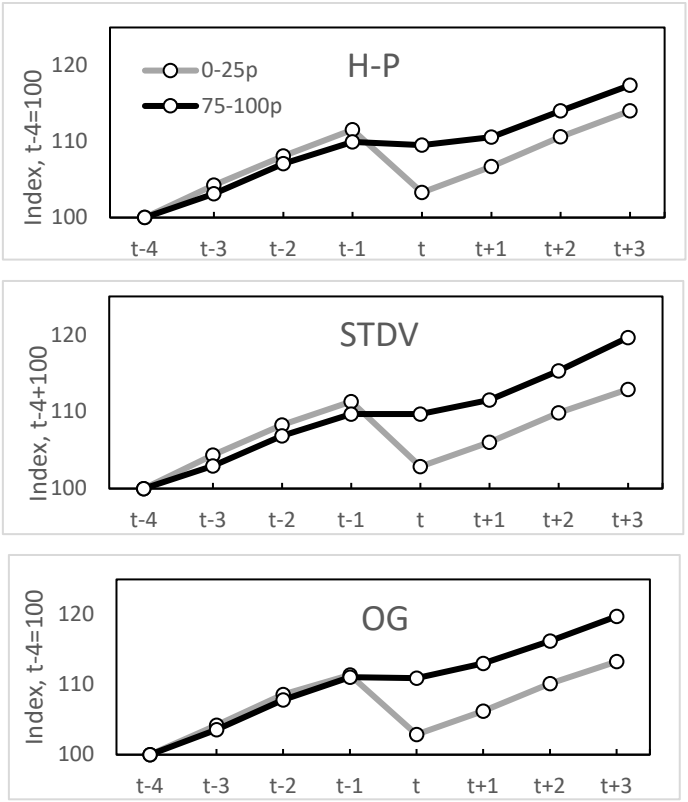


Note: H-P: Harding and Pagan (2002); STDV: Negative real GDP growth equal or in excess of one standard deviation of the country concerned; OG: The output gap turns negative and below –1% of GDP.

It may also be worth noting that the downward shift in economic activity after major downturns is not a statistical artefact of a distribution dominated by extremes. A permanent loss of output compared

to the pre-crisis years is on average observed also after comparatively mild recessions (Figure 3). The size of the downward shift is smaller but still visible.

Figure 3: Real GDP around major economic downturns (index, t-4=100) 25th and 75th percentile



Note: H-P: Harding and Pagan (2002); STDV: Negative real GDP growth equal or in excess of one standard deviation of the country concerned; OG: The output gap turns negative and below –1% of GDP.

To complete the typical profile of major downturns and intent on exploring, in a preliminary fashion, possible patterns, we extend our descriptive analysis to a number of other macroeconomic variables of interest, notably investment and the government budget. The motivation for looking at investment is obvious. Apart from being a component of aggregate demand, investment expenditure can promote economic growth in the medium term through the supply side. Hence, recessions with a stronger drop in investment should, everything else equal, be followed by a stronger downward shift in the trend of economic expansion. The reason for looking at the government budget is equally evident. Fiscal support, if implemented in a timely and targeted fashion, has the potential of stabilising output and can ideally counter the mechanisms causing scarring effects outlined in Section 2.

Private and government investment (in constant prices) turn out to behave very differently around major economic downturns. The growth rate of private investment follows a profile close to – but with a larger amplitude – the one of total output staging a visible although slightly lagged rebound. This

confirms the established insight that private investment is very pro-cyclical. In clear contrast, government investment slows down much less in the year of the downturn offering some degree of stabilisation. However, and this is an important finding for the following steps of our analysis, it does not rebound after recessions or actually declines.

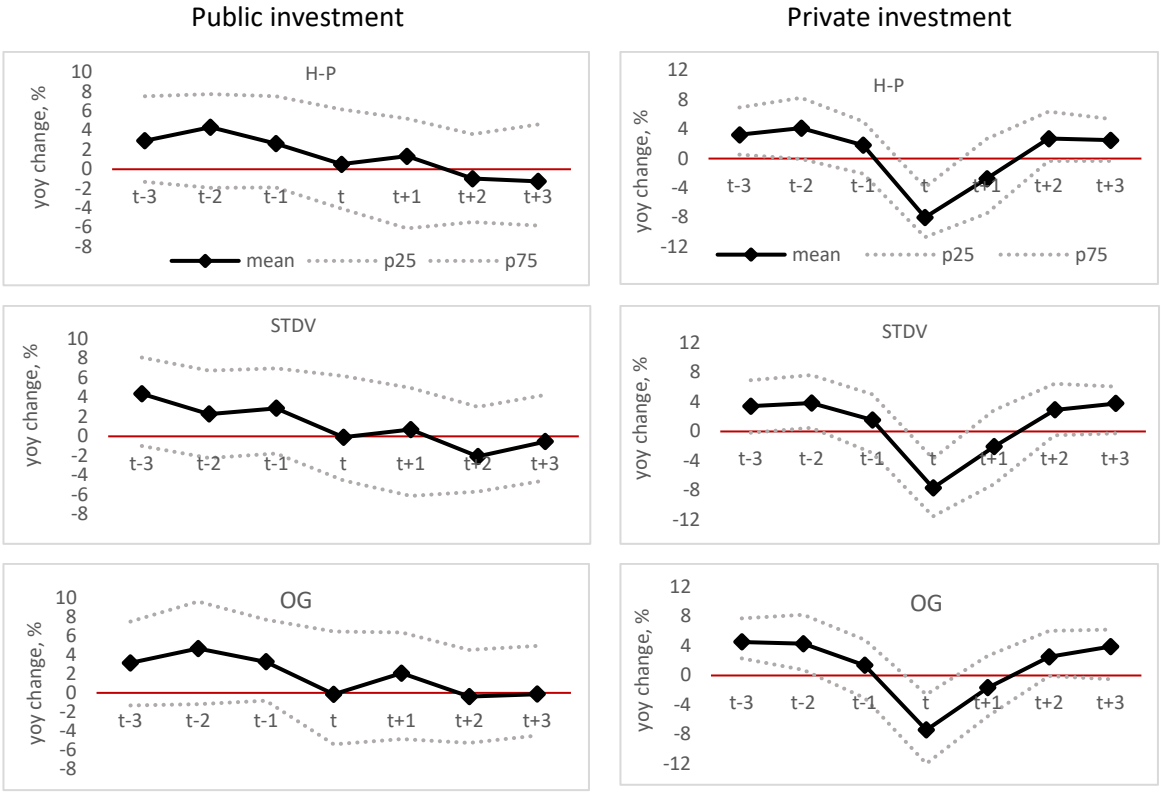
The profile of government spending (in constant prices) is consistent with the stabilisation function of fiscal policy: it increases during a downturn.[6] Belying the notion of long inside lags, the bulk of the increase takes place in the same year output drops. While annual data may blur the exact timing of the policy intervention, the swift response of fiscal policy may also be explained by our focus on larger downturns when, unlike during more moderate slowdowns, there is no doubt about the opportunity of a fiscal intervention. In the year of the economic downturn, the average rate of increase of government spending rises above pre-recession years - on average by around two percentage points or more. It slows down again in the years after the recession, but remains positive. As a result, spending stays well above pre-crisis levels while the share of public investment declines.

Translated into the language commonly used to characterise the general orientation of fiscal policy over the cycle, in our sample fiscal policy responds to major shocks with a sizeable expansionary fiscal impulse. The year after the downturn the budget deficit is 3 to 4% of GDP higher than prior to the recession. The bulk of the fiscal impulse - around 2/3 - stems from the operation of automatic stabilisers.[7] The remaining part are discretionary increases in current expenditure while public investment remains essentially flat. Governments start adjusting expenditure during the economic recovery inter alia by cutting public investment, but the deficit-to-GDP ratio remains significantly above pre-recession levels as economic activity embarks on a lower trend.

[6] We use the GDP deflator to obtain budgetary variables in constant prices.

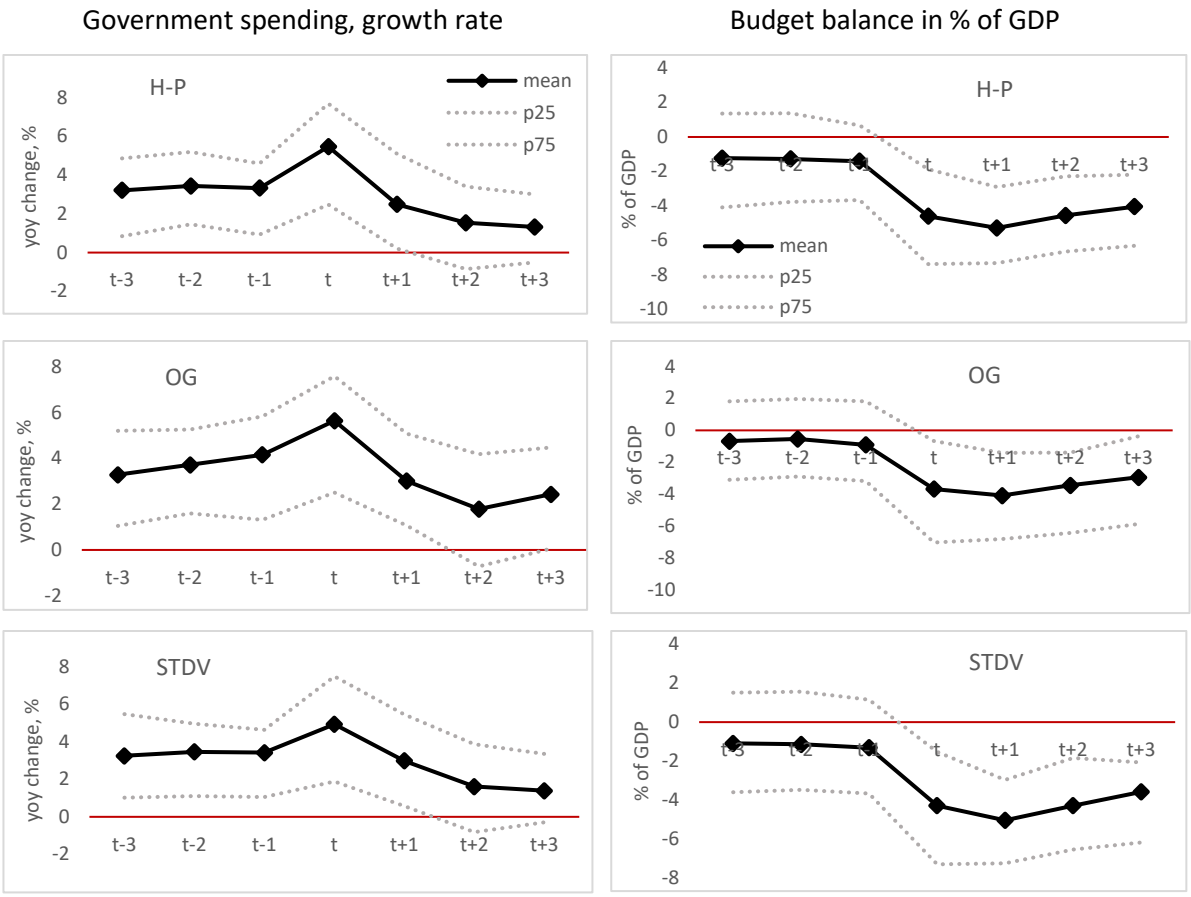
[7] In practice, automatic stabilisers predominantly work through the inertia of discretionary spending in the wake of a loss of output and government revenues. Governments do not lay off nurses, teachers or other public officials during recessions, nor do they typically cut pensions or other major transfers. They keep expenditure plans on track while replacing the shortfall of revenues with borrowing. Revenue or expenditure items directly linked to the cycle, notably unemployment benefits, are very small compared to the bulk of discretionary spending (see In 't Veld et al. 2013).

Figure 4: Growth of public and private investment around major economic downturns.



Note: H-P: Harding and Pagan (2002); STDV: Negative real GDP growth equal or in excess of one standard deviation of the country concerned; OG: The output gap turns negative and below –1% of GDP.

Figures 5: Government spending and the budget balance around major economic downturns



Note: H-P: Harding and Pagan (2002); STDV: Negative real GDP growth equal or in excess of one standard deviation of the country concerned; OG: The output gap turns negative and below –1% of GDP.

4. The size of scarring and policy implications

Regardless of the specific channels one may have in mind causing lasting effects after major economic downturns, the notion of scarring implicitly or explicitly assumes that absent a significant shock, economic growth would continue along a stable trend. Our empirical analysis is also built on this assumption or working hypothesis. We measure the size of scarring of episode *t* in country *i* as the average difference between (pre-crisis) trend real GDP and the actual evolution of real GDP in the years t+3 to t+7 following the major economic downturn:

$$Scarring_{i,t} = \sigma_{i,t} = \frac{1}{5}\sum_{\tau=3}^{7} \frac{\left(Pre{-}crisis\ trend\ GDP_{i,t+\tau} - Actual\ GDP_{i,t+\tau}\right)}{Pre{-}crisis\ trend\ GDP_{i,t+\tau}} \qquad (1)$$

Trend real GDP is extrapolated from pre-crisis growth as a 10-year average.[8] We exclude the two years prior to the crisis to account for the fact that the economy may have been in a boom before entering a recession. Our definition of scarring implies the following sign convention: a positive (*negative*) estimate of scarring means average actual GDP falls short of (*exceeds*) the pre-crisis trend.

Figure 6 illustrates our approach for the US, Japan, Germany and Italy. The sequence of straight lines springing from actual real GDP are the counterfactual trends of economic activity, that is, the assumed course of real GDP in the absence of major economic downturns. The pattern of variable trends is clearly visible across the four jurisdictions, which are characterised by significant political, institutional and regulatory differences. In the wake of major downturns, real GDP does not return to the pre-crisis trend. The size of the downward shift varies from episode to episode and, based on eyeballing, there seems to be no evident correlation with the depth of the recession.

[8] In the next version of our paper we will test the sensitivity of our results to variations of the extrapolation period.

Figure 6: Graph with real GDP and succession of extrapolated trends (US, Japan, Germany and Italy)

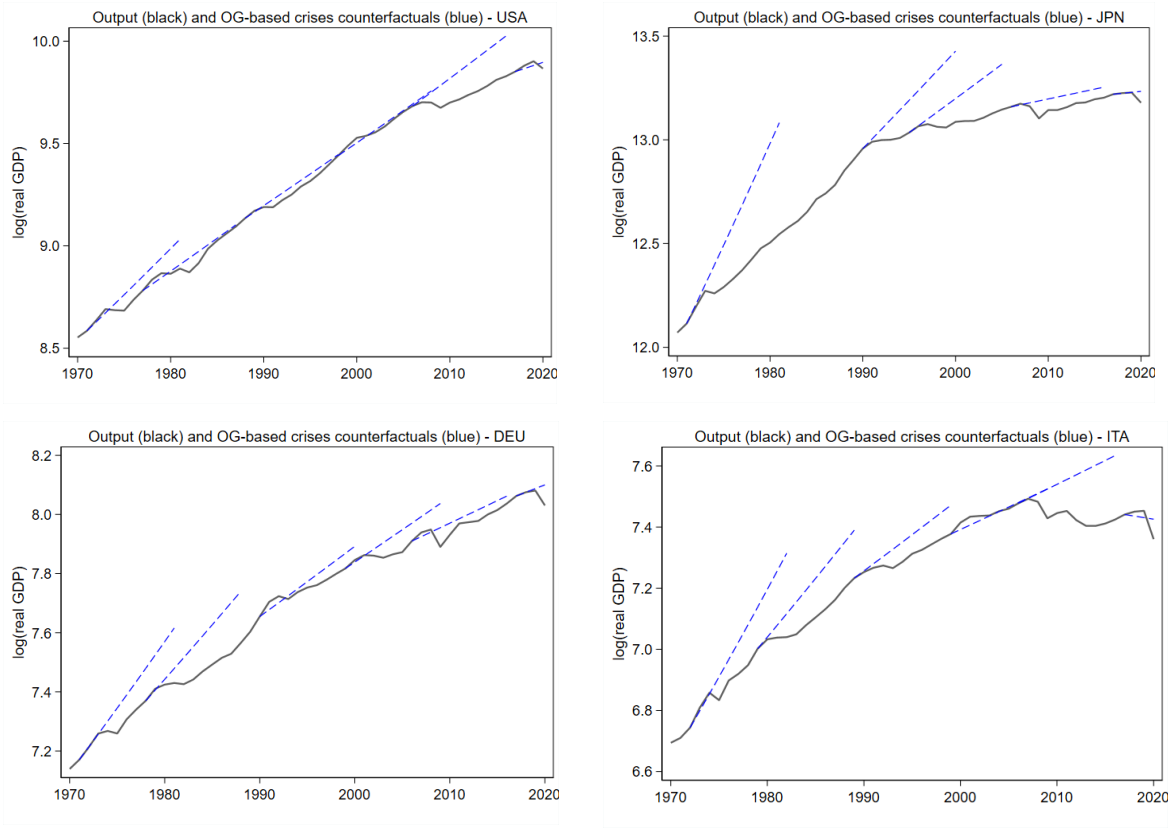
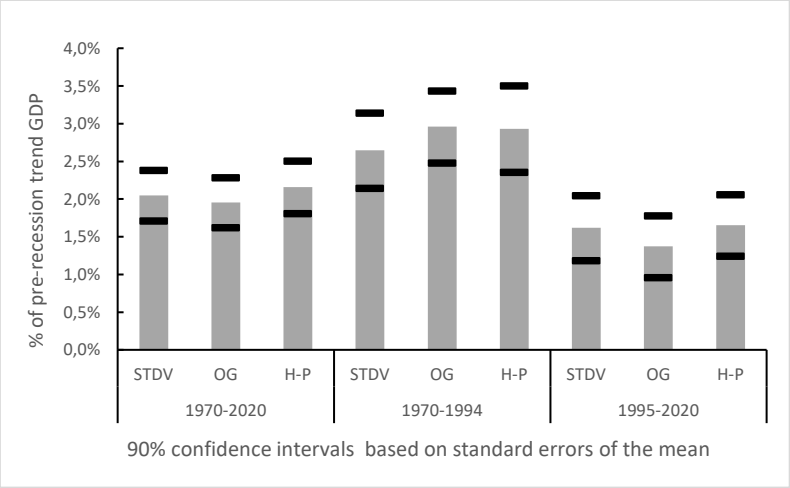


Figure 7 looks beyond individual country cases. It shows the average size of scarring across all countries for the three identification methods of major economic downturns. The estimated effect is sizeable and significant. Over the full sample period (in all country/years) the scarring effect amounts to around 2% per year. Using the average drop of real GDP of around 2 1/2 % during severe economic downturns as reference, it means that 80% of the initial loss of income turn out to be lasting. Of note, the average scarring effect is lower in the second half of our sample (1995-2020), but still sizable, inter alia because most countries experienced declining rates of economic growth since the 1960s.

Figure 7: Average scarring effect after major economic downturns,
By identification method and time period

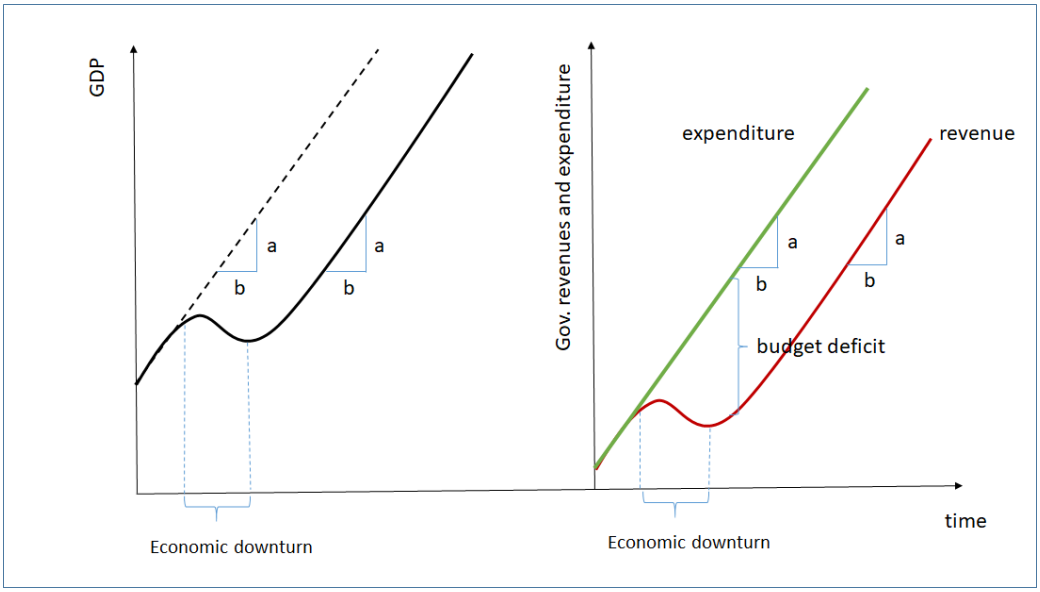


Note: Average scarring as per equation (1). The number of major economic downturns is smaller than in Table 1 as the reference period for the calculation of trend GDP and scarring goes beyond the 3 years preceding and following the major downturn used in this graph for illustrative purposes. Hence, some observations/episodes are lost. H-P: Harding and Pagan (2002); STDV: Negative real GDP growth equal or in excess of one standard deviation of the country concerned; OG: The output gap turns negative and below –1% of GDP.

Scarring effects of the size detected in our sample have important implications for budgetary policies. A lasting downward shift in GDP will inevitably translate into a corresponding reduction in the level of government revenues and, ceteris paribus, into a lower budget surplus or higher deficit; thus, issues of sustainability arise (Figure 8). With a budgetary sensitivity to the cycle of 0.5, 2% of scarring per year translates, everything else equal, into a 1% of GDP increase in the budget deficit. By way of example, take a government running a balanced budget predicated on a rate of potential GDP growth of say a/b prevailing before an unexpected downturn hits the economy and assume the elasticity of government revenues to nominal GDP is equal to one (see Figure 8).[9] Let us further assume that in the face of an unexpected shock the government decides not to launch any discretionary fiscal expansion but to let automatic stabilisers play fully. It does so by keeping its expenditure on the pre-crisis trend while revenues drop with GDP. As a result, it will be running a budget deficit. After some time, the economy recovers but does not return to the pre-crisis trend; it settles on a lower path with possibly the same rate of growth as prior to the downturn. In such a case, absent an adjustment of expenditure levels or a discretionary increase of revenues, the government will be facing persistent deficits and a rising debt level (see Figure 8).

[9] In most EU countries the elasticity of total government revenues to GDP is very close to one meaning that progressive elements of some individual taxes are compensated by the regressive elements of other revenue items.

Figure 8: Stylised effect of scarring on the budget with an expenditure benchmark



Note: The dashed line in the graph on the left hand side represents the trend of economic activity before the economic downturn with growth rate a/b. The government is assumed to follow and expenditure benchmark where expenditure is capped at the rate of growth of GDP a/b and government revenues are taken to have GDP elasticity equal to 1.

This example illustrates a more fundamental problem for fiscal policy makers, namely to establish the sustainable level of economic activity or, using common economic parlance, to estimate potential output. What makes the problem so difficult is uncertainty: governments have to navigate on sight through thick fog: they do not and cannot know for certain whether a downturn will produce lasting effects on output or not. And even if they did know, it would still make sense to launch fiscal stabilisation measures in the short term (automatic or discretionary or both) to mitigate the impact on households and firms and to switch towards consolidation later on, once the recovery has taken hold. The main difficulty is to determine the right moment to pivot from stabilisation to consolidation: withdrawing support too early may affect the future path of growth; waiting too long affects the sustainability of public finances. There is no operational rule that would allow policy makers to pin down the right moment. Moreover, strong political economy motives are at play in practice. Evidence shows policy makers tend to attach a higher weight to downside risks (see Larch at al. 2021). They may be tempted to interpret scarring effects as incomplete cyclical recoveries and delay consolidation, while empirical evidence indicates that in the medium and long run the right type of fiscal adjustment produces positive supply side effects (see Alesina et al., 2020)

In the recent past, a growing number of observers has argued that the difficulty of finding the right moment to switch from stabilisation to consolidation is primarily linked to the notorious uncertainty

surrounding real time output gap estimates (see for instance Claeys at al., 2016; or Darvas et al., 2018). They suggest replacing structural budget balances, which rely on real-time output gap estimates, with expenditure benchmarks. The idea of expenditure benchmarks is as simple as it is intuitive: they cap the growth rate of government expenditure at a rate equal or lower than the medium-term rate of potential output growth while letting revenues fluctuate over the cycle. As a result, they are expected to safeguard sustainable public finances while allowing for automatic stabilisation over the cycle.

The implicit assumption underpinning the purported superiority of expenditure benchmarks is the absence of significant scarring effects. Just take a new look at Figure 6 and assume the US government had strictly followed an expenditure rule in the wake of the Global Financial Crisis by keeping expenditure at the level and growth rate implied by the pre-2008 GDP trend. It may well have dampened the impact of the crisis in the short term and even mitigated possible hysteresis effect. However, without subsequent adjustments of expenditure levels it would have continued to run significant deficits well after the crisis was over. In other words, in the presence of permanent shifts of output levels or scarring effects fiscal policy cannot avert the issue of assessing potential output in real time regardless of the operational rule that may be used to guide budget plans and their implementation. Sooner or later an assessment is to be made as to whether government expenditures follow a sustainable path, or whether they have to be adjusted in line with an updated assessment of potential output, which tends to shift after major downturns.

The possible advantage of an expenditure benchmark may rather lie with the practical implementation of the rule, notably the frequency of updates. If one were to revise the level of potential output and, in turn government expenditure, every year or even every semester it would not offer significant improvements compared to current practice under the Stability and Growth Pact (SGP). By contrast, extending the guidance and monitoring cycle to say three of four years would probably offer a better balance between the need to stabilise in the short run on the one hand and re-assessing medium and long-term sustainability of budgetary policies on the other.

The uncertainty around the sustainable level of economic activity and, by extension, the sustainable level of government expenditure can be addressed by two simple but potentially very effective measures: a safety margin on expenditure growth and sun set clauses for discretionary expenditure increases deliberated in the wake of downturns.

The safety margin would consist in capping expenditure growth at a rate below prevailing estimates of sustainable output growth. A real-life example of such a safety margin is or was the so-called Zalm rule, named after the Dutch Finance Minister Gerrit Zalm. In 1994, Mr Zalm introduced the practice of fixing spending growth for a period of four years anchored around cautious macroeconomic

projections and by subtracting a margin from latest estimates of medium-term economic growth. The declared objective of the margin was to increase the likelihood of attaining budgetary targets (see Bos, 2008). Since 2007, the Dutch government no longer applies the safety margin but safeguarded the four-year spending rule based on macroeconomic projections produced by the CPB, Netherlands Bureau for Economic Policy Analysis.[10]

Explicit sun set clauses would help switching from fiscal expansion to fiscal consolidation during a recovery phase. By experience, once introduced by law it is politically very difficult to reverse additional expenditure. An explicit expiry date would facilitate the necessary correction after the downturn. Lawmakers would still be in a position to insist on additional expenditure with a new legislative initiative, but finding the necessary majority when economic conditions have improved will arguably be more difficult.

5. Determinants of scarring

The pervasive pattern of lasting shortfalls of real GDP after major economic downturns begs an important question: Can fiscal policy avert or at least dampen scarring effects? The ambition of stabilising output via expansionary fiscal policy is deeply rooted in macroeconomics ever since Keynes postulated his theory of how to manage economic depressions in the 1930s.

Following initial enthusiasm, the assessment of fiscal policy as a stabilisation tool has changed over time. Today's view is best characterised by a clear tension between what fiscal policy can do and actual practice, between the economics and politics of fiscal policy. The economics is very clear: There is a broad consensus that fiscal policy multipliers are positive in the short term. The actual size of the multiplier may depend on a number of factors such as the composition of the fiscal policy intervention, the position of the economy in the cycle and the monetary policy stance, but there is little doubt that, leaving aside some very special cases, a fiscal expansion will increase GDP on impact. By way of contrast, there is equally abundant evidence that fiscal policy often tends to be ill-timed: reins are loosened when the economy is in good times and in some cases even tightened when the economy goes south. The issue of pro- or a-cyclical fiscal policy, especially but not exclusively when government debt is high, is well-documented in the literature (see for instance Talvi and Végh, 2005, Debrun et al., 2008, Combes et al. 2017, Larch et al., 2021)

As indicated above, the pro- or a-cyclical nature of fiscal policy is often attributed to the objective difficulty to assess the cycle in real time and to the fact that fiscal policy makers may pursue motives

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other than maximising an economy's welfare (see for instance Cimadomo, 2012, Shi and Svenson, 2003). However, uncertainty and political economy are less of an issue during major economic downturns. In the face of a larger drop in economic activity, real-time estimates of cyclical conditions are fairly unambiguous and typically produce a common sense of urgency among policy makers, which facilitates political agreements to launch fiscal support measures. The last two major economic shocks – the Global Financial Crisis and the Covid-19 pandemic – are two clear cases in point. In most advanced countries, they both triggered important and clearly countercyclical fiscal expansions.

According to established macroeconomic theory, a well-timed fiscal expansion can kill two birds with one stone. First and foremost, it offers short-term support to households and firms when the economy tanks. Second, if the right instruments are used, it can avert or mitigate the impairments to aggregate supply postulated by the alternative models outlined in Section 2. While there is abundant evidence about the effectiveness of fiscal policy in the short run, their role in mitigating scarring effects is less clear-cut.

To answer the question of whether fiscal policy can moderate scarring effects of major economic downturns, we run the following type of regression:

$$\sigma_{i,t} = \sum_j \alpha_j \left(x_{j,i,t} - \bar{x}_{j,i,t-3|t-1}\right) + \sum_j \beta_j \left(y_{j,i,t} - \bar{y}_{j,i,t-3|t-1}\right) + \sum_j \delta_j D_{j,i,t} + \theta + e_{i,t} \qquad (2)$$

- $\sigma_{i,t}$ is the scarring effect produced by the economic downturn in time *t* in country *i*, as defined in equation (1). To check robustness we use the three identification methods for severe economic downturns.
- $x_{j,i,t}$ stands for the growth rate (or GDP ratio) of fiscal variable *j* of country *i* in year *t*. As fiscal variables we include public spending net of public investment, public investment and the budget balance. Since annual data can mask the actual timing of a downturn and the fiscal response (i.e. a recession that commences in Q3 of year *t-1* may only show up in annual data in year t), the change in the growth rate (or GDP ratio) in year t is calculated vis-à-vis the average of the three years preceding the major downturn, i.e. $\bar{x}_{j,i,t}$. The acceleration of public current expenditure and of public investment in year *t* can be interpreted as a measure of active or discretionary fiscal policy, while the change of the budget balance is used as proxy for the effect of automatic stabilisers. [11]

[11] See footnote 7. For government revenue elasticities equal to 1 (the average in the OECD) the effect of a change in GDP (Y) on the budget balance is $\frac{G}{Y}\frac{dY}{Y}$, i.e. the expenditure-to-GDP ratio, a measure of the size of government,

- $y_{j,i.t}$ is the growth rate of control variable *j* of country *i* in year t. $\bar{y}_{j,i.t-3|t-1}$ is the average of the same variable over the three preceding years.
- $D_{j,i}$ includes a number of dummies capturing relevant macroeconomic, institutional or policy features of country *i*, e.g. EU membership or the implementation of structural reforms. [12]
- θ is a constant and $e_{i,t}$ is a country and time specific white-noise residual.

Table 2 to 4 report the results of our regressions where columns represent alternative specifications.

times the shortfall of of GDP from the pre-crisis path. In our sample of major downturns, the effect amounts to around 2 ¼ - 2 1/2 % of GDP or 2/3 of the average overall change in the budget balance in a downturn.

[12] Table A2 in the Annex provides detailed information about all variables, including sources.

Table 2: Regression results - Downturns identified with the Harding-Pagan criterion (H-P)

	1	2	3	4	5	6	7	8
Growth of private investment in t (vs mean)	-0.0935***	-0.0717***	-0.0716***	-0.0347	-0.0324	-0.0229	-0.0364	-0.0222
	(0.0202)	(0.0216)	(0.0218)	(0.0253)	(0.0267)	(0.0239)	(0.0256)	(0.0288)
Growth of current public spending in t (vs mean)		0.00773	0.00744		0.00188			
		(0.0258)	(0.0287)		(0.0279)			
Growth of public investment in t (vs mean)			0.000446		-0.00594		-0.00892	-0.00784
			(0.0190)		(0.0185)	(0.0154)	(0.0168)	(0.0173)
Budget balance as % of GDP in t (vs mean)				-0.208**	-0.221**	-0.220***	-0.206**	-0.207**
				(0.0869)	(0.0916)	(0.0822)	(0.0887)	(0.0934)
Dummy: systemic banking crisis (L & V)						2.129***		
						(0.582)		
Dummy: crisis in t+2 to t+7							0.546	
							(0.428)	
Dummy: labour market reform in t to t+2								-0.140
								(0.472)
Constant	0.963***	1.135***	1.137***	1.096***	1.049***	0.947***	0.899***	1.325***
	(0.321)	(0.307)	(0.318)	(0.292)	(0.310)	(0.278)	(0.330)	(0.381)
R-square	0.208	0.135	0.135	0.198	0.202	0.326	0.217	0.146
Observations	84	74	74	76	74	76	76	70

Note: The dependent variable is the average shortfall in output in the period three to seven years after the crisis. Standard errors in parentheses: $*$ p < 0.10, $**$ p < 0.05, $***$ p < 0.01. L&V is Laeven and Valencia (2018).

Table 3: Regression results - Downturns identified with the criterion based on the standard deviation of real GDP growth (STDV)

	1	2	3	4	5	6	7	8
Growth of private investment in t (vs mean)	-0.0904***	-0.0789***	-0.0761***	-0.0231	-0.0179	-0.0129	-0.0201	-0.0114
	(0.0160)	(0.0175)	(0.0172)	(0.0221)	(0.0225)	(0.0215)	(0.0216)	(0.0245)
Growth of current public spending in t (vs mean)		0.0210	0.0444*		0.0245			
		(0.0247)	(0.0264)		(0.0249)			
Growth of public investment in t (vs mean)			-0.0385**		-0.0394**	-0.0321**	-0.0395**	-0.0320*
			(0.0179)		(0.0165)	(0.0148)	(0.0155)	(0.0163)
Budget balance as % of GDP in t (vs mean)				-0.265***	-0.275***	-0.279***	-0.256***	-0.274***
				(0.0744)	(0.0758)	(0.0718)	(0.0730)	(0.0812)
Dummy: systemic banking crisis (L & V)						1.156*		
						(0.607)		
Dummy: crisis in t+2 to t+7							0.717*	
							(0.381)	
Dummy: labour market reform in t to t+2								0.0980
								(0.443)
Constant	0.906***	1.043***	0.955***	1.071***	0.955***	0.953***	0.772***	1.107***
	(0.266)	(0.266)	(0.263)	(0.242)	(0.242)	(0.236)	(0.267)	(0.328)
R-square	0.289	0.230	0.279	0.342	0.399	0.411	0.411	0.283
Observations	81	71	71	73	71	73	73	66

Note: The dependent variable is the average shortfall in output in the period three to seven years after the crisis. Standard errors in parentheses: $*$ p < 0.10, $**$ p < 0.05, $***$ p < 0.01. L&V is Laeven and Valencia (2018).

Table 4: Regression results - Downturns identified with the output gap criterion (OG)

	1	2	3	4	5	6	7	8
Growth of private investment in t (vs mean)	-0.0526***	-0.0279	-0.0399	-0.0172	-0.0108	-0.0139	-0.0222	-0.0184
	(0.0196)	(0.0264)	(0.0256)	(0.0273)	(0.0283)	(0.0262)	(0.0261)	(0.0259)
Growth of current public spending in t (vs mean)		-0.0550*	-0.0125		-0.0261			
		(0.0293)	(0.0316)		(0.0315)			
Growth of public investment in t (vs mean)			-0.0557***		-0.0526***	-0.0582***	-0.0590***	-0.0574***
			(0.0187)		(0.0184)	(0.0161)	(0.0162)	(0.0169)
Budget balance as % of GDP in t (vs mean)				-0.146*	-0.166**	-0.144**	-0.147**	-0.147**
				(0.0764)	(0.0746)	(0.0721)	(0.0721)	(0.0726)
Dummy: systemic banking crisis (L & V)						1.950		
						(2.035)		
Dummy: crisis in t+2 to t+7							0.396	
							(0.426)	
Dummy: labour market reform in t to t+2								0.0827
								(0.501)
Constant	1.327***	1.538***	1.155***	1.298***	1.108***	1.097***	0.881**	1.047***
	(0.323)	(0.367)	(0.375)	(0.341)	(0.368)	(0.330)	(0.381)	(0.340)
R-square	0.064	0.062	0.145	0.063	0.189	0.185	0.185	0.177
Observations	107	95	95	98	95	98	98	98

Note: The dependent variable is the average shortfall in output in the period three to seven years after the crisis. Standard errors in parentheses: $*$ p < 0.10, $**$ p < 0.05, $***$ p < 0.01. L&V is Laeven and Valencia (2018).

The first finding of note pertains to the type of the initial shock. In line with the literature exploring the impact of economic crises, our analysis corroborates the lasting and more disruptive output effect of systemic banking crises as defined by Laeven and Valencia (2018). The coefficient of the respective dummy variable is positive, meaning it adds to the average scarring effect, and statistically significant at conventional levels of confidence for two of our three identification methods of severe economic downturns.

Second, the results for private investment - one of the main drivers of medium and long-term economic growth - are also in line with expectations: more (less) private investment during downturns goes along with lower (higher) scarring effects. The estimated coefficients are consistently negative across all specifications even if not always statistically significant at conventional levels.

Thirdly, and turning to fiscal policy, our results do not support the view that budgetary expansions in the year of the downturn always dampen scarring effects; the type of expansion matters. For starters, an acceleration of current expenditure compared to pre-crisis years yields ambiguous results and the statistical significance of the estimated coefficient is weak. Moreover, the change of the budget balance - our proxy of automatic stabilisers - consistently comes with a negative and statistically significant sign.[13] Although, counterintuitive at first sight, these results reflect the difference between the short and the medium-term effect of fiscal policy. The automatic deterioration of the budget balance is proportional to the depth of the economic downturn as previously adopted expenditure plans are implemented and revenue shortfalls are replaced with borrowing on the assumption that output will eventually return to pre-crisis levels. While such a course of action helps stabilise output in the short term the effect on the medium term seems to go into the opposite direction; sticking to pre-defined expenditure plans is not an effective recipe to address structural or supply-side effects of a major economic downturn.

These finding have to be seen against the seasoned literature on fiscal multipliers. Most estimates of short-run multipliers are sizeable and positive, especially in economic bad times, meaning that on impact fiscal expansions support output when needed most. However, the same literature also shows that the positive effect on output is not very persistent and even turns negative in the medium run.

[13] Our analysis points to some multi-collinearity between the acceleration of current expenditure and the change in the budget balance: In some specifications one of the two tends to be insignificant when included at the same time. This result is not surprising although not predetermined. An acceleration of current expenditure is a sufficient but not a necessary condition for recording a deterioration of the budget balance during a downturn.

The notable exception are multipliers of government investment expenditure. They tend to increase over time thanks to their effect on the supply side and productivity.[14]

Our regressions confirm this assessment. The acceleration of public investment is predominantly associated with negative and statistically significantly coefficients, pointing to a moderating effect on scarring. Although encouraging, the mitigating effect of government investment on scarring comes with an important downside. The estimated impact is small. A one percentage point increase in government investment yields at best a 0.06 percentage point reduction in the average scarring effect, that is, less than 1/20 of the average scarring recorded in our sample.

The use of aggregate data in our regressions does not support a detailed analysis of different types of fiscal expansions. More importantly, the observed time profile of public investment does not tell us anything about the efficiency of investment projects. However, as indicated in Section 3, our data reveal a tendency of governments to mainly rely on discretionary increases in current expenditure coupled with the effect of automatic stabilisers. Public investment does - on average - not play a substantive role in the fiscal response to major economic downturns. The average growth rate of public investment is around zero in the year of the downturn, but down by more than 3 percentage points compared to the average rate of growth in the three preceding years. Moreover, public investment growth turns slightly negative in the years after the economic downturn confirming the established insight that investment is the easy victim of consolidation efforts.

Overall, the average fiscal strategy deployed in response to major economic downturns does not seem to be particularly effective in addressing the contractive forces that weigh on aggregate supply during and after a major economic downturn

Without prejudice to their short-term stabilisation effects, fiscal expansions in the wake of major economic downturns can go along, and in our sample do go along with legacy effects for public finances in the medium and long term. Absent consolidation efforts after the downturn, government debt remains at a higher level or continues to increase, thereby affecting policy options going forward. Starting with the seminal contribution of Bohn (1998) many studies have shown how government debt affects the stabilisation function of fiscal policy. In particular, countries with higher government debt

[14] For a comprehensive overview of fiscal multipliers see Batini et al. (2014) and van der Wielen (2020), or Gechert (2015) for a meta-analysis.

are more likely to run pro-cyclical fiscal policies, i.e. higher surpluses or lower deficits, for a given cyclical condition (see for instance Combes et al. 2017 and Larch et al. 2021).

Our sample very much confirms this insight. Table 5 presents the results of auxiliary regressions, where our three measures of the fiscal response to major economic downturns, plus private investment, are modelled as a function of their own lag, economic activity, and the level of government debt. The latter has a clear dampening effect on the fiscal response, i.e. higher government debt weighs on the leeway to run short-term fiscal expansions during major economic downturns, which in turn affects scarring in the medium term. Hence, the general finding reported by many earlier studies such as Debrun et al. (2008) or Bénétrix and Lane (2013) applies to severe economic downturns, too. In plain words, governments running high debt-to-GDP ratios have less room for fiscal manoeuvre during a major downturn and, in turn, face the risk of higher scarring effects.

Table 5: The impact of government debt on the fiscal response in years of a major economic downturns

	Current public spending	Public investment	Private investment	Budget balance
Lag growth of current public spending in t (vs mean)	-0.0678			
	(0.0863)			
Lag growth of public investment in t (vs mean)		0.129		
		(0.0859)		
Lag growth of private investment in t (vs mean)			-0.112***	
			(0.0147)	
Lag budget balance as % of GDP in t (vs mean)				0.556***
				(0.0823)
Real GDP growth in t (vs mean)	0.159	0.629*	2.922***	0.404***
	(0.280)	(0.359)	(0.231)	(0.0851)
Debt-to-GDP ratio in t-1	-0.0285	-0.0663**	0.0144	0.0122**
	(0.0182)	(0.0277)	(0.0177)	(0.00585)
Dummy: systemic banking crisis (L & V)	2.339	2.720	-0.194	-1.078
	(2.691)	(4.273)	(2.732)	(0.899)
Constant	2.067	2.250	0.186	-0.675
	(1.642)	(2.346)	(1.507)	(0.517)
R-square	0.034	0.068	0.596	0.433
Observations	130	147	147	140

Note: The dependent variables are the growth rate of current public spending, public and private investment, and the budget balance, respectively. Based on the episodes of major economic downturns derived from all three identification methods. Standard errors in parentheses: $*$ p < 0.10, $**$ p < 0.05, $***$ p < 0.01.

6. Conclusions

Scarring effects are a recurring feature of major economic downturns. In our sample of 26 advanced OECD economies covering the period 1970 to 2020, we identify more than 100 episodes. In most cases, real GDP does not return to the trend observed prior to the downturn but embarks on a lower growth path. Three to seven years after the main shock, economic output still falls on average 2% per year short of the counterfactual level.

We extend the literature by investigating the role of fiscal policy. Governments tend to react quite forcefully to major economic downturns mostly by letting automatic stabilisers play and by deliberating discretionary increases in current expenditure. Public investment remains broadly stable during the downturn and does not recover in the successive years, when it actually declines on average.

Inferential analysis suggests that a fiscal expansion in the year of a major economic downturn can lower scarring effects if it is centred on government investment. However, the impact turns out to be comparatively small, leaving governments with lower output levels and, by extension, with higher deficits and debt. The limited impact of fiscal expansions on medium to long-term output seems to be linked to a composition that favours current government expenditure over investment. This is consistent with the literature showing that multipliers of current expenditure tend to go towards zero in the medium term, while those of public investment remain positive or accumulate over time.

In the medium to long term, the succession of scarring effects and higher deficits leads to higher government debt, which in turn tends to limit fiscal space in the event of new recessions. We show that in years of a major economic downturn, higher government debt tends to go along with lower growth rates of government expenditure - both current and investment - and/or lower government deficits. This finding very much confirms the more general result in the literature on how government debt affects fiscal performance.

Overall, our empirical analysis suggests three main issues for fiscal policy in the wake of major economic downturns. The first one refers to the composition of fiscal expansions. Policy makers favour increases in current expenditure, which produce a direct impact on voters in the short term but reverts quickly over time. Although it would have a more lasting effect on output, public investment does not receive particular attention. The usual political economy mechanisms are at play.

Second, the sizable scarring effects emerging from our analysis do not corroborate the idea that anything that stimulates demand, keeps people in their jobs and in turn, helps avert hysteresis effects. The impact of automatic stabilisers and current expenditure on scarring is actually negative. As

economic shocks do not come with a label, there may be more specific supply mechanisms, which cannot be addressed with anything that 'just' stimulates demand or by simply keeping expenditure plans on track. Fiscal interventions have to be more targeted taking into account channels other than the labour market and the possible depreciation of human capital during longer spells of unemployment.

The third issue pertains to the legacy for public finances. In the event of scarring effects, short term stabilisation comes at the price of a tighter sustainability constraint down the road especially if scarring effects recur and are not followed by consolidation efforts. During economic recoveries policy makers tend to be hesitant and think twice before withdrawing fiscal support and switching to consolidation. The years prior to the Covid-19 pandemic are a clear case in point: the forecasts of most national and international organisations consistently saw the balance of risks tilted to the downside or in balance. The idea that economic growth may have been at the lower trend that emerged after the global financial crisis was not prominent.

What are the lessons or implications of our analysis for the economic impact of the Covid-19 pandemic and the war in Ukraine? To begin with, the Covid-19 pandemic was of a very specific nature. It triggered a sharp downturn of economic activity, which did not come on the back of a financial crisis or a severe supply shock. The downturn was the result of a legally imposed lockdown to protect the life of people. The lockdown was lifted again more or less swiftly as the epidemiological situation improved giving rise to a strong rebound of economic activity. Besides the specific nature of the Covid-19 pandemic, the strong economic rebound also testifies to the forceful fiscal policy response. With conventional monetary policy constrained at the effective lower bound of nominal interest rates, the mobilisation of government budgets to soften the short-term impact of the pandemic on households and firms has indeed been impressive. The severity of the crisis has given rise to an unambiguous and general sense of urgency. In EU countries with high pre-pandemic debt the fiscal expansion in the short term was made possible by the decision of the ECB to buy large quantities of new government debt via the Pandemic Emergency Purchase Programme (PEPP).

Projections published prior to the war in Ukraine seemed to vindicate the forceful policy response. Most advanced economies were expected to return or exceed the pre-crisis level of economic activity in 2022. Some forecasts even anticipate countries to return to pre-crisis trends in 2023 or after. At the same time, specific assessments of supply-side constraints, such as skills shortages in some sectors or

persisting supply chain issues, pointed to growing bottlenecks already in the course of 2021 (see Athanasy et al., 2022).[15]

The Russian invasion of Ukraine and the related terms-of-trade shock disrupted the rebound from the pandemic and increased risks of lasting effects going forward. While latest forecasts still project positive annual average real GDP growth in 2022 a return to pre-pandemic trends is now very unlikely. The very nature of the new shock affects the supply side of energy-importing countries and plain fiscal demand management will not help, on the contrary.

In this new difficult context, the EU's Recovery and Resilience Facility (RRF) assumes particular importance. Agreed in response to the economic downturn caused by the Covid-19 pandemic in 2020, it became operational in the second half of 2021 with the largest impact expected in 2022 and 2023. The RFF is an instrument that aims to help Member States address medium-term challenges, by supporting structural reforms and government investment projects. If implemented effectively with a focus on additional and productive investment, and structural reforms, it certainly has the potential to mitigate the heightened risk of scarring ensuing from two major shocks in rapid succession Still, fiscal policy makers need to prepare for the likely prospect that expenditure levels are structurally above revenues especially in light of the strong increases implemented during the pandemic a large part of it being permanent. Consolidation will be inevitable but hopefully not by mainly cutting government investment.

[15] https://www.ecb.europa.eu/pub/economic-bulletin/focus/2022/html/ecb.ebbox202202_01~272e32f7f4.en.html

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Annex

Identifying major economic downturns

To check the robustness of our findings, we use three alternative methods for identifying severe economic downturns:

- HP: Harding and Pagan (2002);
- STDV: Negative real GDP growth in excess of one standard deviation of the country concerned;
- OG: The output gap turns negative and below –1% of GDP.

The detailed list of major economic downturns by country and year linked to the three methods is provided in Table A1 below. Figure A1 shows the total number of downturns in our sample of 26 OECD member states for the three methods.

Figure A1: Number of economic downturns in our sample of 26 OECD countries by identification method

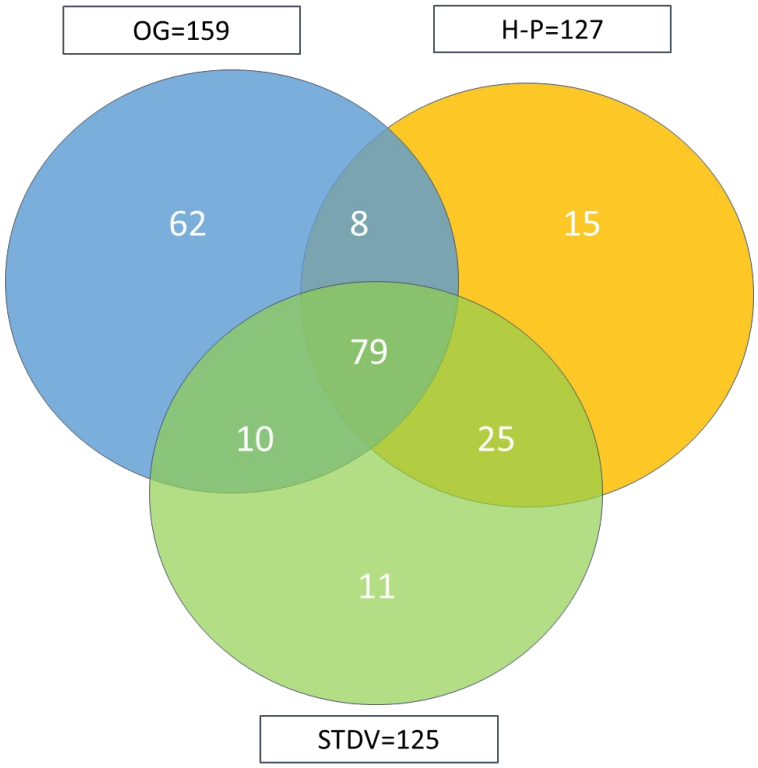

Table A1: Major economic downturns by country and identification method

	Included in sample	STDV	OG	H-P
Australia	1	1977, 1982, 1990, 2019	1974, 1982, 1990, 2000, 2019	1982, 1990, 2019
Austria	1	1975, 1978, 1981, 2009, 2020	1975, 1978, 1981, 1993, 2001, 2009, 2020	1975, 1978, 1981, 2009, 2020
Belgium	1	1975, 1981, 1993, 2009, 2020	1975, 1977, 1981, 1993, 2001, 2009, 2020	1975, 1981, 1993, 2009, 2020
Bulgaria	0	1992, 1997, 1999, 2009, 2020	1992, 1997, 2010, 2020	1997, 1999, 2009, 2020
Canada	1	1982, 1990, 2009, 2020	1975, 1982, 1991, 2003, 2009, 2020	1982, 1991, 2009, 2020
Switzerland	1	1975, 1982, 1991, 2009, 2020	1975, 1982, 1992, 2002, 2009, 2020	1975, 1982, 1991, 2002, 2009, 2020
Cyprus	0	2009, 2012, 2020	1991, 1993, 1996, 2012, 2020	2009, 2012, 2020
Czech Republic	0	1991, 2009, 2020	1991, 1997, 2009, 2020	1997, 2009, 2012, 2020
Germany	1	1975, 1982, 1993, 2003, 2009, 2020	1974, 1981, 1993, 2002, 2009, 2020	1975, 1982, 1993, 2002, 2009, 2020
Denmark	1	1974, 1980, 2008, 2020	1974, 1980, 1988, 2002, 2009, 2020	1974, 1980, 1988, 2008, 2020
Spain	1	1993, 2009, 2011, 2020	1979, 1993, 2009, 2020	1981, 1993, 2009, 2011, 2020
Estonia	0	1994, 2008, 2020	1994, 1998, 2009, 2020	1999, 2008, 2020
Finland	1	1991, 2009, 2012, 2020	1976, 1981, 1991, 2002, 2009, 2020	1991, 1999, 2012, 2020
France	1	1975, 1993, 2009, 2020	1975, 1981, 1993, 2002, 2009, 2020	1975, 1993, 2009, 2020
United Kingdom	1	1974, 1908, 1991, 2009, 2020	1975, 1980, 1991, 2009, 2020	1974, 1980, 1991, 2008, 2020
Greece	1	1974, 2009, 2020	1974, 1982, 1990, 1993, 2011, 2020	1974, 1981, 1987, 1993, 2008, 2015, 2020
Croatia	0	2009, 2012, 2020	1999, 2009, 2020	1999, 2009, 2020
Hungary	0	1992, 2009, 2012, 2020	1993, 2009, 2020	2009, 2012, 2020
Ireland	1	1983, 1986, 2008, 2012	1983, 1986, 1991, 2009, 2016	1983, 2008
Iceland	1	1983, 1992, 2009, 2020	1974, 1983, 1992, 2009, 2020	1983, 1988, 1991, 2009, 2020
Italy	1	1975, 2009, 2012, 2020	1975, 1982, 1992, 2002, 2009, 2020	1975, 1993, 2008, 2012, 2020
Japan	1	1974,1998, 2008, 2020	1974, 1993, 1998, 2009, 2020	1974, 1998, 2008, 2020
South Korea	1	1980, 1998, 2009, 2012, 2019	1972, 1975, 1980, 1989, 1992, 1998, 2003, 2008, 2019	1980, 1998, 2020
Lithuania	0	1992, 2009	1992, 1999, 2009, 2020	1999, 2009, 2020
Luxembourg	1	1975, 1981, 2008, 2012, 2020	1975, 1980, 1994, 2003, 2009, 2020	1975, 1981, 2008, 2012, 2020
Latvia	0	1991, 2009	1992, 2009, 2020	1995, 2008, 2020
Mexico	1	1983, 1986, 1995, 2009, 2020	1971, 1983, 1986, 1995, 2002, 2009, 2020	1982, 1986, 1995, 2001, 2009, 2019
Malta	0	2001, 2004, 2009, 2011, 2020	1998, 2001, 2004, 2009, 2016, 2020	2001, 2009, 2020
The Netherlands	1	1975, 1981, 2002, 2009, 2012, 2020	1975, 1981, 1992, 2002, 2009, 2020	1981, 2009, 2012, 2020
Norway	1	1982, 1988, 2008, 2019	1981, 1988, 1999, 2001, 2009, 2018	1988, 2009, 2020
New Zealand	1	1970, 1975, 1977, 1986, 1991, 2008, 2020	1977, 1986, 1989, 1997, 2008, 2020	1970, 1975, 1977, 1986, 1991, 2008, 2020
Poland	0	1991, 2020	1991, 2001, 2012, 2020	2020
Portugal	1	1975, 1984, 2009, 2011, 2020	1975, 1983, 1993, 2003, 2009, 2011, 2020	1975, 1984, 1993, 2003, 2009, 2011, 2020
Romania	0	1991, 1997, 2009, 2020	1991, 1997, 2010, 2020	1997, 2009, 2020
Slovakia	0	1999, 2009, 2020	1999, 2009, 2011, 2020	1999, 2009, 2020
Slovania	0	1991, 2009, 2012, 2020	1992, 2009, 2020	2009, 2012, 2020
Sweden	1	1977, 1981, 1991, 2008, 2012, 2020	1977, 1992, 2001, 2009, 2020	1977, 1981, 1991, 2008, 2012, 2020
Turkey	1	1979, 1989,1994, 1999, 2001, 2009	1979, 1989, 1991, 1994, 1999, 2001, 2008, 2014, 2016, 2019	1979, 1994, 1999, 2001, 2009
USA	1	1970, 1974, 1980, 1982, 1991, 2008, 2020	1974, 1980, 1991, 2001, 2009, 2020	1974, 1980, 1982, 1991, 2008, 2020

Note: STDV, OG and H-P stand for the methods used to idendentiy major economic downturns based respectively on the standard devision of real GDP growth, the output gap and the Harding-Pagan approach.

Table A2: Definition and sources of variables

Variable name	Definition	Source
Output	Gross domestic product at current prices	EC, AMECO
	Gross domestic product at 2015 reference levels	EC, AMECO
Price deflator	Price deflator gross domestic product	EC, AMECO
	Price deflator gross domestic product	OECD, Economic Outlook
Employment	Total employment, labour force survey basis	OECD, Economic Outlook
Unemployment	Total unemployment rate	EC, AMECO
Public debt	General government consolidated gross debt	EC, AMECO
Budget balance	General government net lending	OECD, Economic Outlook
Primary balance	General government primary balance	OECD, Economic Outlook
Public revenues	Total receipts of general government	OECD, Economic Outlook
Public spending	Total disbursements of general government	OECD, Economic Outlook
Total investment	Gross fixed capital formation, total economy	EC, AMECO
		OECD, Economic Outlook
Public investment	Gross fixed capital formation, general government	EC, AMECO
		OECD, Economic Outlook
Private investment	Gross fixed capital formation, private sector	EC, AMECO
Net total investment	Net fixed capital formation, total economy	EC, AMECO
Net private investment	Net fixed capital formation, private sector	EC, AMECO
Net public investment	Net fixed capital formation, general government	EC, AMECO
Consumption	Total consumption	EC, AMECO
Systemic banking crisis	Dummy, 1 if systemic banking crisis	Laeven & Valencia (2008, 2013, 2018), IMF
Currency crisis	Dummy, 1 if currency crisis	Laeven & Valencia (2008, 2013, 2018), IMF
Sovereign debt crises	Dummy, 1 if sovereign debt crisis	Laeven & Valencia (2008, 2013, 2018), IMF
IMF programme	Start and end dates of IMF programmes	IMF Monitoring of Fund Arrangements (MONA)
Labour market reforms	Dummy, categorical	Duval et al. (2018), IMF
Product market reforms	Dummy, categorical	Duval et al. (2018), IMF