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Patrick Minford asks what sort of trade agreement should the UK negotiate with the EU

Risk sharing in the euro area is of vital importance to ride the next downturn, argues Daniel Dăianu

Nicolas Kraus discusses hydrogen technology and how it can contribute to Europe's climate goals

THE GLOBAL TRADE PLATFORM

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What sort of trade deal should the UK negotiate with the EU?

Free trade arguments are examined in depth, and Patrick Minford considers the costs and gains should there be no agreement

Norway, Switzerland, Canada, Japan? The formulae are rolled out daily in this debate! In fact as David Davis as well as other ministers have said many times, the UK is unique and should negotiate its own deal.

What should this be? First let us put it in the context of the gains the UK gets from leaving the EU's Customs Union and Single Market, which the referendum result endorsed. The EU's protectionism of food and manufactures raises prices for all those products by an average of 20% over the best available prices in the developed world. Getting rid of this protection via Free Trade Agreements gives us a big gain from the resulting free trade: on our calculations, consumer prices would fall 8% and GDP be 4% larger[1].

The EU's Single Market entails EU regulation across the whole of our economic life, even though only 12% of our GDP is involved in selling to the EU. By leaving the Single Market we can in time recalibrate that regulation to suit the UK economy, with gains we estimate at around 2% of GDP[2]. The 12% who sell to the EU simply need to meet EU product standards, nothing else.

We can also control immigration, especially of the unskilled where the EU Single Market forces us to give a 20% wage subsidy to EU immigrants, especially at the expense of poorer households whose living standards on our calculations rise 15% from Brexit.

Any trade deal we do with the EU needs to leave these economic gains from a 'clean' Brexit intact, while politically too honouring the referendum result. In the next section I go into the much-contested free trade arguments in more detail.

The simplest EU trade deal that achieves this is a simple zero reciprocal tariff agreement on goods. Since our product standards are already aligned, there can be no 'non-tariff barriers' either way. On this basis we would have 'Full

Access' to the Single Market. This and our other free trade agreements would give us effectively global free trade, without compromising our power to regulate our own economy and control our own borders.

Some City pressure groups are also demanding convergence of financial regulation. However, all that is needed is adherence to the WTO rules of non-discrimination under which we and the EU give each other's financial industries the same access to our financial markets as we give to other countries: mostly this takes the form of 'equivalence', effectively mutual recognition of regulative financial standards. This also makes sense since these standards are in-

For the UK a breakdown would be a short-term nuisance but a substantial economic gain; for the EU it is both a short-term nuisance and a substantial economic loss ternationally agreed within the BIS and other finance industry forums. In fact strictly it does not even need to be in the deal since it just follows WTO law.

An EU trade deal of this simple form - zero tariffs on goods, and non-discriminatory treatment in services - preserves the gains of a clean Brexit. It does not disrupt trade with the EU. It should be easily ratified: it does not require unanimous agreement by all EU countries and regions.

By contrast the idea being put around by some that we should 'shadow' EU regulation and Customs barriers in a 'soft Brexit' is incomprehensible. It loses us our Brexit gains; and for what? 'Access' to the Single Market that we would have anyway; and a compulsion to have industrial protection designed for the benefit mainly of continental industries, at the expense of both our and their consumers. Brexit can deliver us from such nonsense; and to that I say Amen.

Why free trade brings key gains to the UK economy - in spite of the latest Civil Service leaked scaremongering

The Civil Service reportedly has redone the Treasury's Brexit long term forecasts with a new approach, so say numerous leaks via *Buzzfeed* and elsewhere. 'Officials believe the methodology for the new assessment is better than that used for similar analyses before the referendum', reports *Buzzfeed*. This new approach has, it seems, dumped the old Treasury calculations and methodology published in the original Treasury Project Fear report during the referendum[3]. Plainly, the criticisms of this old approach - persistently so from us- have hit home; if so, that is real progress.

Under its old approach, the Treasury used something they called the 'gravity approach'. This approach consisted of three sets of correlations over time and across countries and/or industries: between trade and membership of different trade blocs; between trade and Foreign Direct Investment; and between FDI and productivity. The final productivity effects were then fed into a standard macro model of the UK economy.

As the Treasury or Civil Service seems now to have conceded, this procedure makes no sense because all these relationships are 'correlations' - correlations do not reveal causation. We have a correlation between unemployment and crime; but it would be dangerous to use it to predict unemployment from data on crime. This is because both these data series are impacted by a complex causal system involving a lot of other factors.

So now the Civil Service seems to have adopted a full world causal trade model. It appears this is the GTAP model; this (Global Trade Analysis Project) model is produced by the GTAP centre at Purdue University in Indiana, USA. This model is the world leader in such analysis, having been continuously developed since 1993 by universities, governments and international bodies; so it is the blindingly obvious choice. Fortunately for us who want to know more about its Brexit implications, it was used by Open Europe in 2015, in a version with 57 sectors and 28 country groupings, containing all countries. It is likely the Civil Service is familiar with this model.

Fortunately, the group of economists working for Open Europe published a paper on their workings[4]. Ciuriak and Xiao do a scenario where the UK has unilateral free trade with the non-EU world, eliminating the 4% tariffs the EU currently imposes. There is a calculated gain to the UK of 0.8% of GDP. However, as explained above the true protection including non-tariff barriers is around 20%. Abolishing this would therefore give a gain of 4% of GDP. We can think of this scenario as close to what general Free Trade Agreements around the world would deliver as intended by current government policy.

They also do a 'Brefta' scenario which is essentially Canada-plus. Here they assume big costs at the UK-ROW 'border' - rules of origin and customs checks. The cost of these to the UK comes out at 1% of GDP. We query this assumption of border costs: how do they arise when the WTO's Trade Facilitation Agreement mandates that borders must be virtual (the median of 18 rich countries in 2016 only physically inspected 2% of its imports and cleared these in one day)[5]. Such costs seem to assume that either the UK or the EU would act illegally at the border, which is of course absurd. On our assessment these border costs are nil.

So what this study finds - under its benchmark policy assumptions - is a loss of 0.2% of GDP. With reasonable policy benchmark assumptions this would become +4% of GDP. This coincides with the finding above (Minford, 2017, op. cit.) of +4% of GDP on policy benchmark assumptions where it is cautiously assumed that EU protection was on a downward trend to 10%, the number fed into that scenario.

We trust this estimate most because we have tested the Cardiff World Trade Model used for this, against the facts of UK trade over the last four decades and it passes the tough statistical test involved, whereas of course GTAP is too large to test in any serious way and certainly no test has been done on the UK aspects of it[6].

So in sum what we have found is that the Civil Service seems now to be using a world trade CGE model which is a defensible and improved methodology; but it has (a) not been tuned to fit UK trade facts and (b) it has used absurdly pessimistic Brexit policy assumptions to 'cook' its anti-Brexit results. According to our trade model, which fits the UK facts and assumes the government's announced policy assumptions, there would be a gain from Brexit of +4%.

According to GTAP and Ciuriak and Xiao's policy assumptions, Brexit costs -0.2% of UK GDP. But put in the right policy assumptions to GTAP and you get +2%. Now put in the policy assumptions of the Civil Service and it is reported we get -5%! Since we only export 12% of our GDP to the EU, one is expected to believe that we will lose the value of almost half of our EU exports. This is pretty silly.

Why there will be a simple Canada+ trade deal with the EU

What about the long-term effects of no deal? Here it is important to use a proper trade model. As noted in Minford and Xu (op.cit.) the Cardiff World Trade Model is the good guide to the facts of UK trade and so we use it in what follows.

Under no deal, but one where the UK pursues its planned policy outside the Single Market and Customs Union, of creating free trade by signing agreements with the non-EU world, the key effect is to lower UK prices of food and manufactures and create competition inside the UK economy with these new prices. Plainly with an EU free trade deal with no reciprocal tariffs and other trade barriers, EU goods would also arrive free of any duty or other hindrance in the UK and would also compete with these world prices; we can assume that in order to preserve their sales their prices would fall in line. This would occur under the high competition assumed in the model as otherwise they would lose all their sales.

For UK producers selling in the EU home competition would force their EU prices to equality with world prices: were one UK producer to get more others would divert output to their market, driving prices into line.

Suppose instead there was no deal and this consisted of existing tariffs being levied mutually by both sides (this in fact is the most likely scenario since non-tariff barriers would be discriminatory, given that the UK and the EU would both continue to apply current product standards). Then the same logic would apply for pricing by EU producers selling in the UK: they would have to match the new competition, so that their UK prices would remain the same as with a deal.

Similarly for UK producers selling into the EU; home competition would force them to match home competition with their EU prices. So EU producers would now have to absorb the UK tariff; and EU consumers would have to pay the EU tariff on top of the invariant UK price. Hence the tariffs on both sides would be paid by the EU, the UK tariffs by EU producers to the UK Treasury, the EU tariffs by EU consumers; of course the EU would receive the tariff revenue from its own consumers, making its overall loss equal to the UK tariff revenue as well as some loss of consumer surplus- estimated at approximately £13 billion[7].

On top of this with no deal the UK financial settlement and the transition period would not occur. The EU would be short of some £28 billion over the rest of its budgetary septennial to 2020; it would also lose the longer-term contribution to net liabilities, reported to be worth another £10 billion or so. Also because its customs union with the UK would stop immediately, it would lose two years' worth of the terms of trade gain its producers make on its balance of trade surplus with the UK - estimated at around £18 billion a year: so two years' worth of that would be another £36 billion one-off loss.

From the UK viewpoint paying no financial settlement would be a gain, avoiding the need to pay some £38 billion. Also with no transition period free trade, own-regulation and own-border-control would come two years earlier, bringing forward that long term gain - at roughly 6% of GDP excluding the budgetary transfer, that would amount to some 12% of GDP; assuming that it would otherwise arrive in 2030, bringing it forward to 2028, when discounted at 3% a year, means it would be worth around an extra one-off gain of 9% of GDP, around £180 billion. It would also gain that tariff revenue paid by the EU producers to the UK Treasury, of £13 billion p.a.; which again, discounted, would be worth some £433 billion.

Of course the short run disruption would be unpopular on both sides of the Channel, with industry and consumers affected. However, UK farming and manufacturing industry has already gained massively from the Brexit devaluation and thereby been given substantial short-term compensation for the efforts they must make to raise productivity; those efforts would have to be made rather earlier, but to the benefit of the national interest.

When one adds up all these gains and losses in present value terms, we obtain plus £651 billion for the UK versus minus £507 billion for the EU: it could not be more open and shut who least wants a breakdown. For the UK a breakdown would be a short-term nuisance but a substantial economic gain; for the EU it is both a short-term nuisance and a substantial economic loss.

Conclusions

Plainly both the UK and the EU will strive to conclude a trade deal and in the process wrap up many other administrative details of cooperation. Failure to reach a deal will be greeted with incredulity and annoyance by citizens of both sides faced with a lot of potential short-run disruption. However, a breakdown remains possible if either side makes intolerable demands. It is for this reason we have made some calculations about the costs and gains of breakdown, besides the short run disruption that would be inevitable to both sides.

These calculations suggest that the EU has a lot to lose from no deal, while on a purely economic calculus the UK would actually gain a fair amount. This suggests that the trade deal, if it occurs, will be concluded on terms close to those the UK will ask for: namely a Canada-plus zero trade barrier on goods, with mutual recognition on services. The UK would remain free after transition to make free trade agreements around the world, to vary its domestic regulation as it sees fit, and to control its borders. ■

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Endnotes
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Trade as an engine of growth: prospects and lessons for Europe

Benoît Cœuré discusses the rebound in trade growth, and argues that structural headwinds will make it less likely that trade can expand at the pace seen pre-crisis

I would like to take this opportunity to discuss an issue which I believe is key for the economic future of Europe and particularly relevant in the Western Balkans: the prospects for trade as an engine of growth. For several years now, global trade growth has puzzled many observers. While global trade grew at about twice the rate of GDP before the crisis, it has slowed measurably since then and has often grown at the same rate as, or even below, that of global output. However, in 2017, world import growth once again outpaced world GDP growth. The euro area is benefiting from this recovery, with export growth the highest in many years.

In my remarks I will argue that the rebound in trade mainly reflects cyclical factors. Accommodative monetary policies worldwide have succeeded in boosting growth and investment and, with them, global imports. Structural headwinds remain, however. Maturing global value chains, geographical shifts in trade and an accelerating push towards more automation make it less likely that trade can again expand at the pace observed during the pre-crisis boom.

To the extent that trade helps lift growth, policymakers have a role to play in providing an environment that is conducive to trade. At the same time, they need to ensure that appropriate systems are in place to support workers affected by secular shifts in both trade flows and labour demand.

Rebound in world trade

Let me start with a few facts and charts. Last year, global imports expanded by 5%, the strongest growth in seven years. Figure 1 shows that the rebound in global trade was broad-based, with both emerging and advanced economies contributing in roughly equal proportions. On Figure 2 you can see that this by and large reflects the fast broadening of the global economic expansion. At the end of last year, 75% of the economies worldwide experienced growth above their three-year averages. In 2016, this share was below 30%. So, the global economy is in a much more robust state today than it was just a few years ago.

The breakdown of extra-euro area exports also shows that the current synchronous expansion is fertile ground for a strong rebound in trade. You can see this in Figure 3. By the end of last year, euro area exporters had expanded their business with virtually all of our main trading partners.

Growing demand from China, and emerging Asia more generally, as well as recovering demand from commodity exporters are once more contributing to, rather than subtracting from, export growth. One exception to this benign picture is the United Kingdom, where Brexit repercussions might already be showing through in the data.

... policy actions must go beyond trade initiatives. In Europe, we need comprehensive policy action, at both EU and national level, to support workers who have lost their jobs due to technological shifts

Trade has also gained momentum within the euro area (see Figure 4). Although intra-euro area export growth is currently somewhat weaker than extra-area growth, we can see that exports are today contributing more evenly to growth across euro area countries. It is no longer only a few member states that are benefitting from a booming global economy.

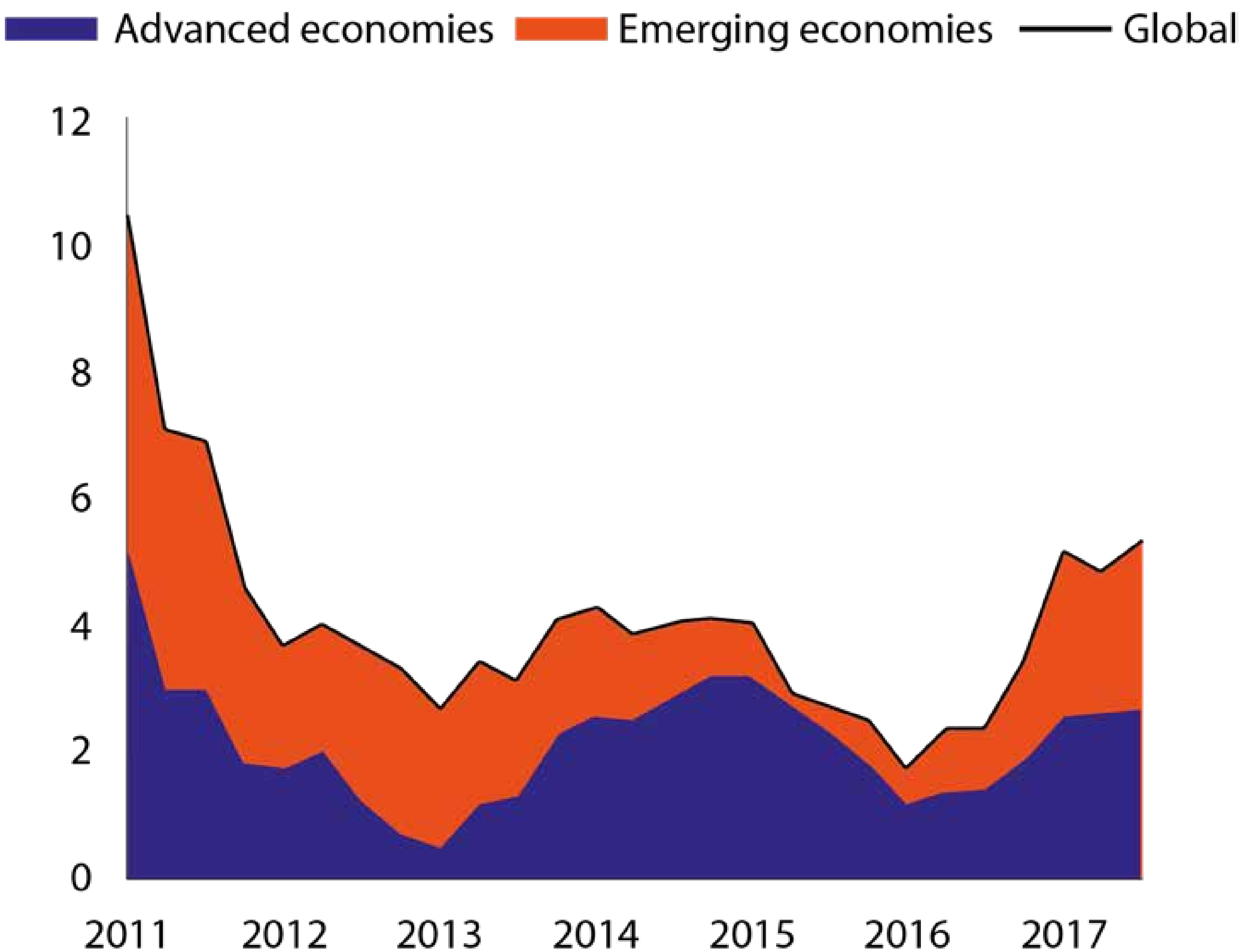
In particular, structural reforms and internal devaluation in formerly stressed economies, together with a protracted period of weak domestic demand during the crisis years, have prompted more firms in these economies to improve their competitiveness and thereby profit from a rise in foreign demand, both inside and outside the currency union.

This is perhaps best illustrated by the share of exports in GDP as seen in Figure 5. Last year, compared with the period 2000 to 2007, this share rose strongly in Ireland and Slovenia, while Portugal, Greece and Cyprus also managed double-digit gains. This supported the economic recovery and helped to reduce unemployment.

A natural side effect of these changes was a notable widening of the euro area's current account surplus (Figure 6). Almost all member states that entered the financial crisis with large current account deficits are today reporting current account surpluses. Of the euro area's 19 member states, 13 have current account surpluses.

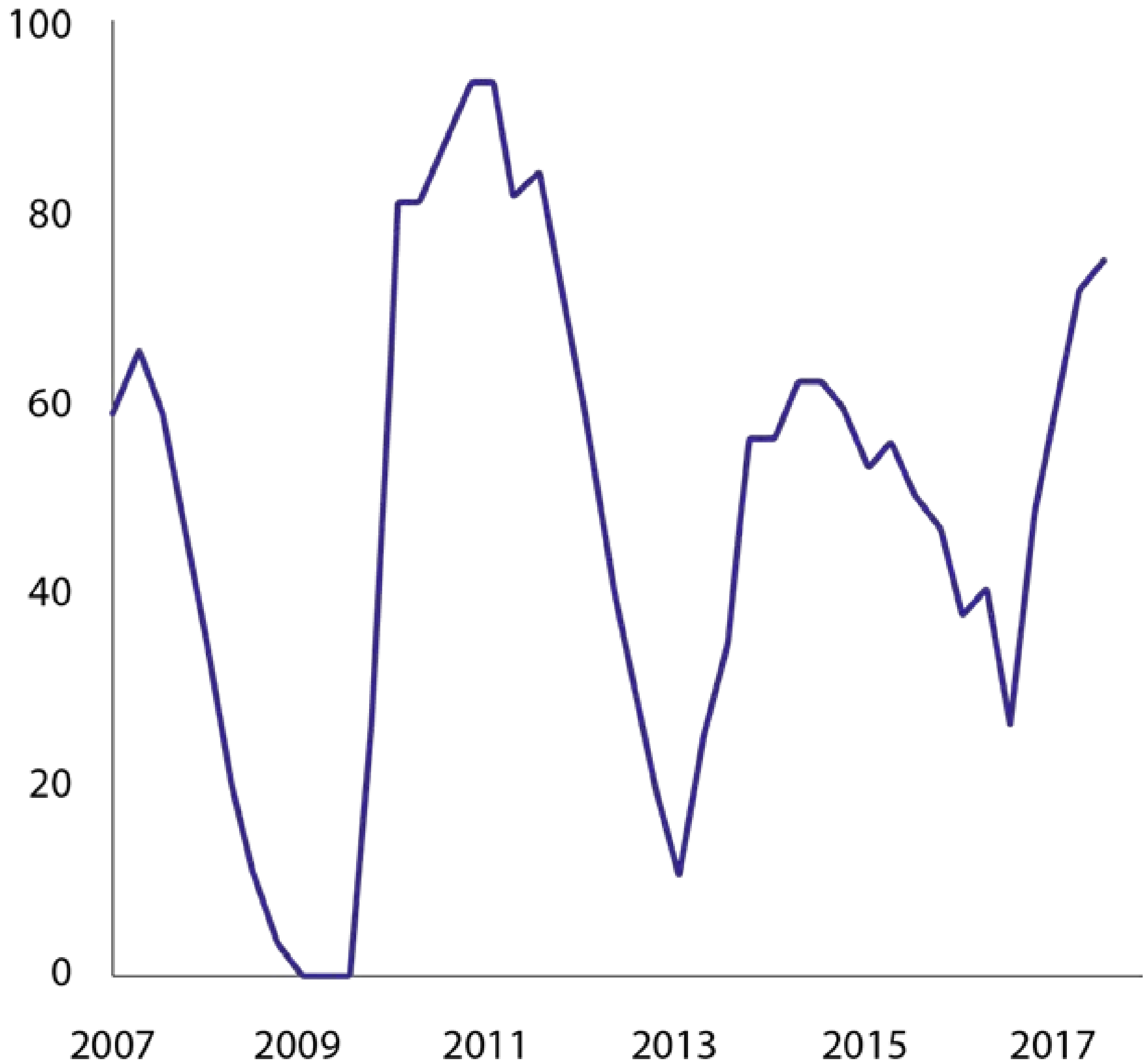
But Figure 6 also illustrates clearly that the rebalancing has remained limited to formerly stressed economies. Up until recently, current account surpluses have continued to rise in Germany and in the Netherlands, the two export powerhouses in the euro area. While these surpluses undoubtedly reflect strong underlying fundamentals in terms of competitiveness, they also reflect an imbalance between domestic savings and investment. Higher domestic investment would therefore be a constructive way to address large current account surpluses and, at the same time, to prepare for future challenges.

Figure 1. Global trade: advanced and emerging economies (year-on-year percent changes)



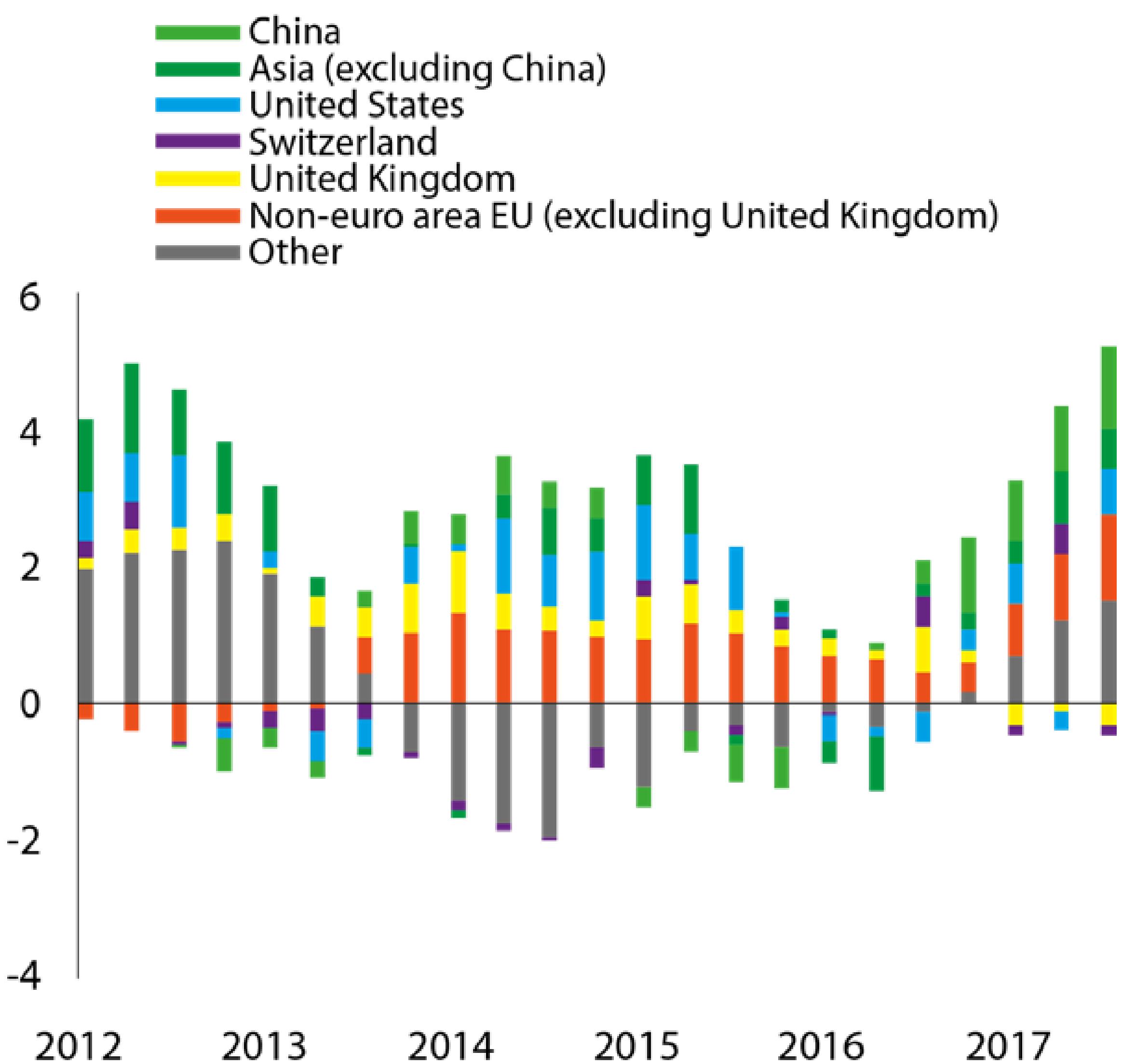
Source: ECB calculations.
Notes: Trade refers to imports of goods and services. Last observation is 2017Q3.

Figure 2. Share of countries with real GDP growth exceeding past three-year average (in percent)



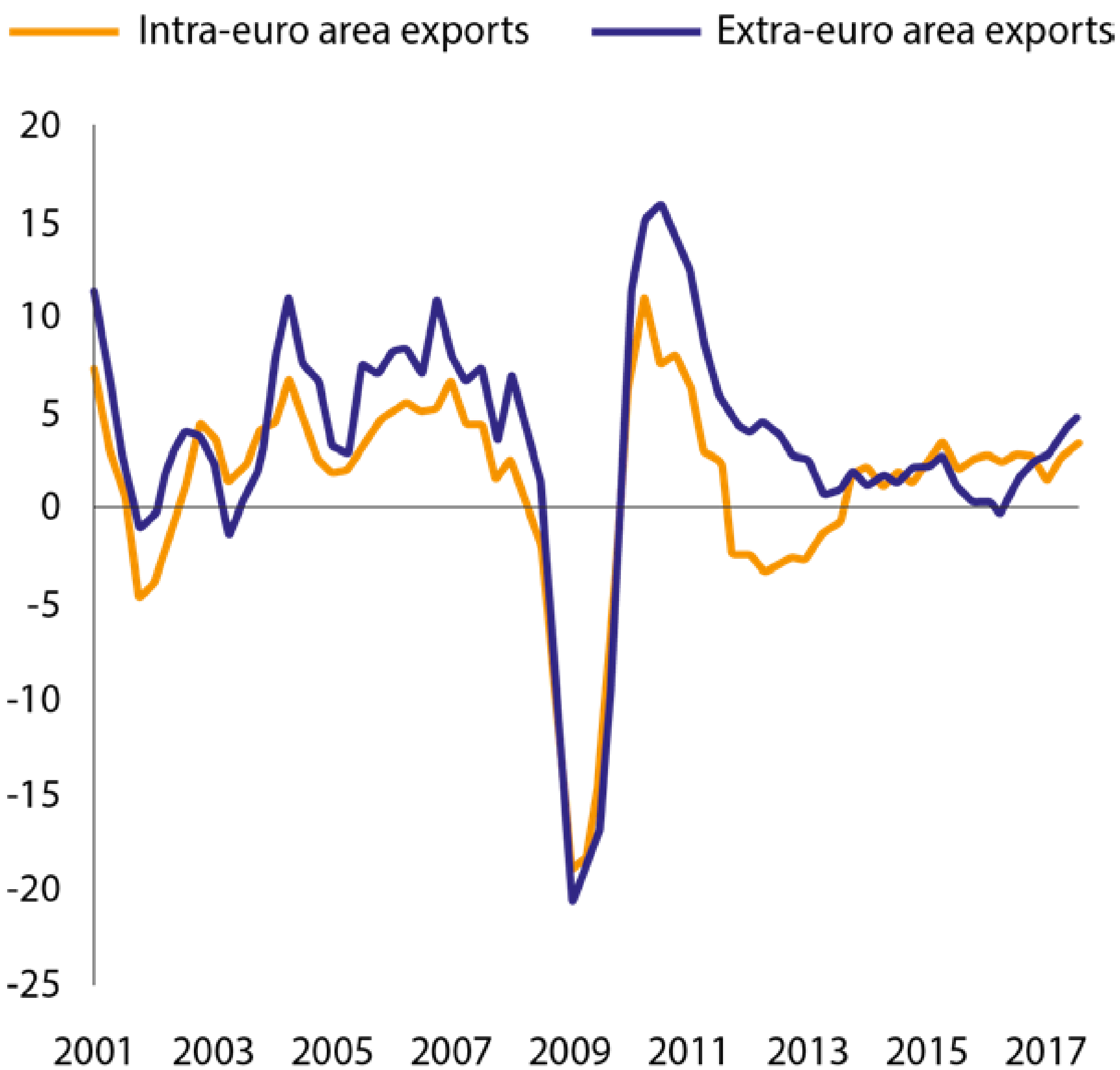
Source: ECB calculations.
Notes: Annual GDP growth rate is calculated for 31 countries and the euro area, accounting for 92% of global GDP in PPP. Last observation is 2017Q3.

Figure 3. Extra-euro area exports by destination (year-on-year percent changes)



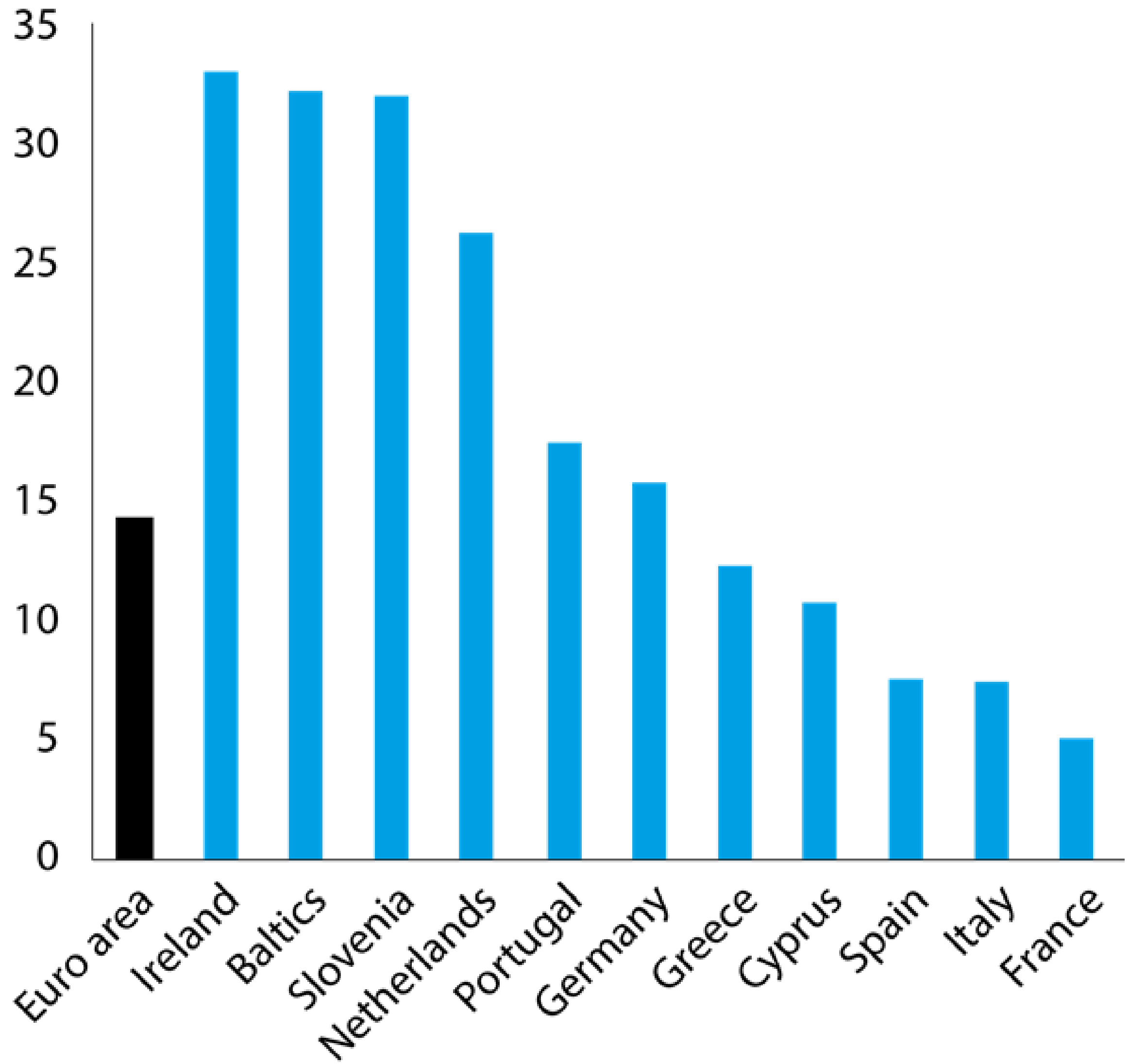
Source: Eurostat.
Notes: Last observation is 2017Q3.

Figure 4. Extra- and intra-euro area exports (year-on-year percent changes)



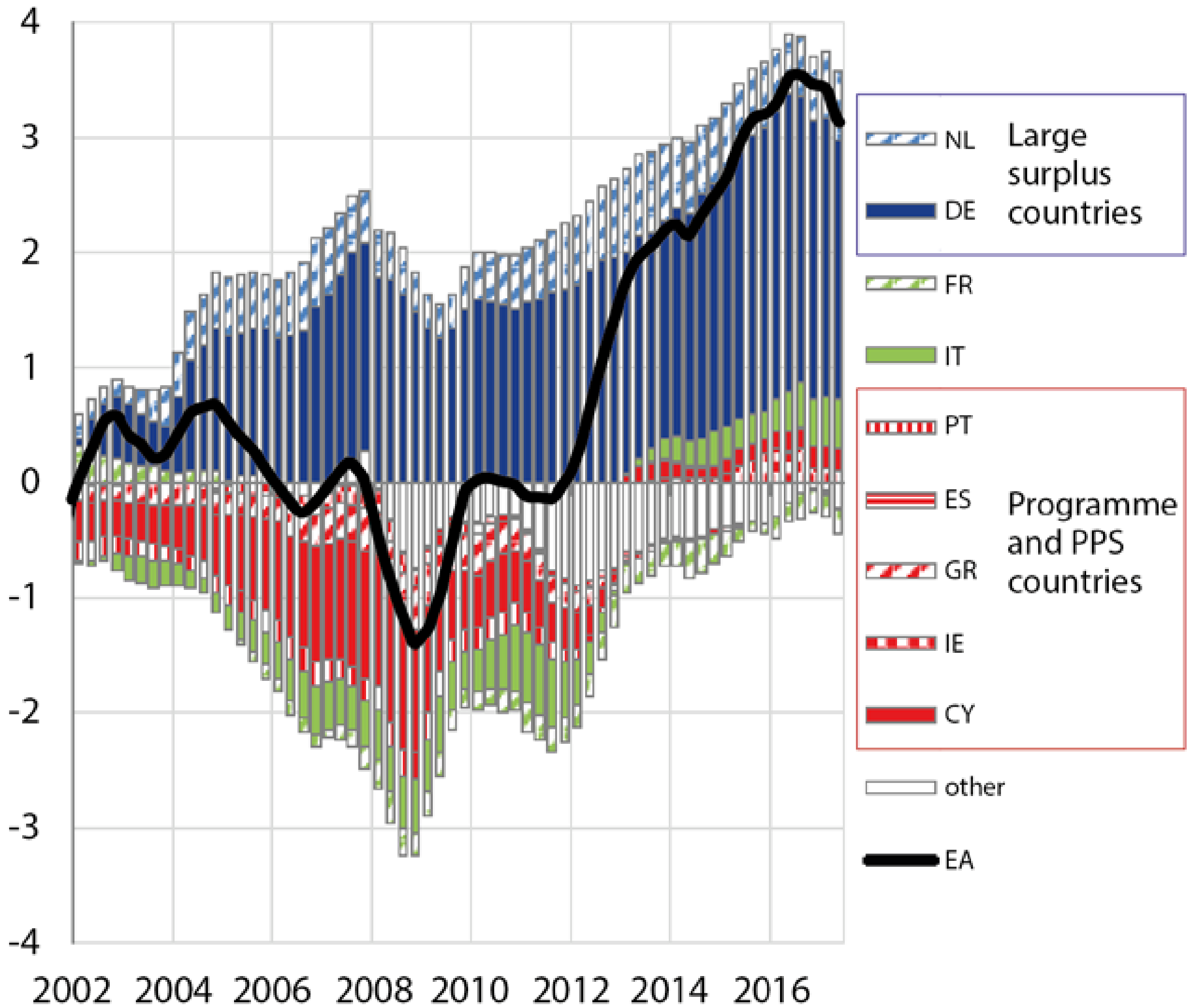
Source: Eurostat.
Notes: Last observation is 2017Q3.

Figure 5. Export share in GDP: difference between 2017 and average 2000-2007 (in percentage points)



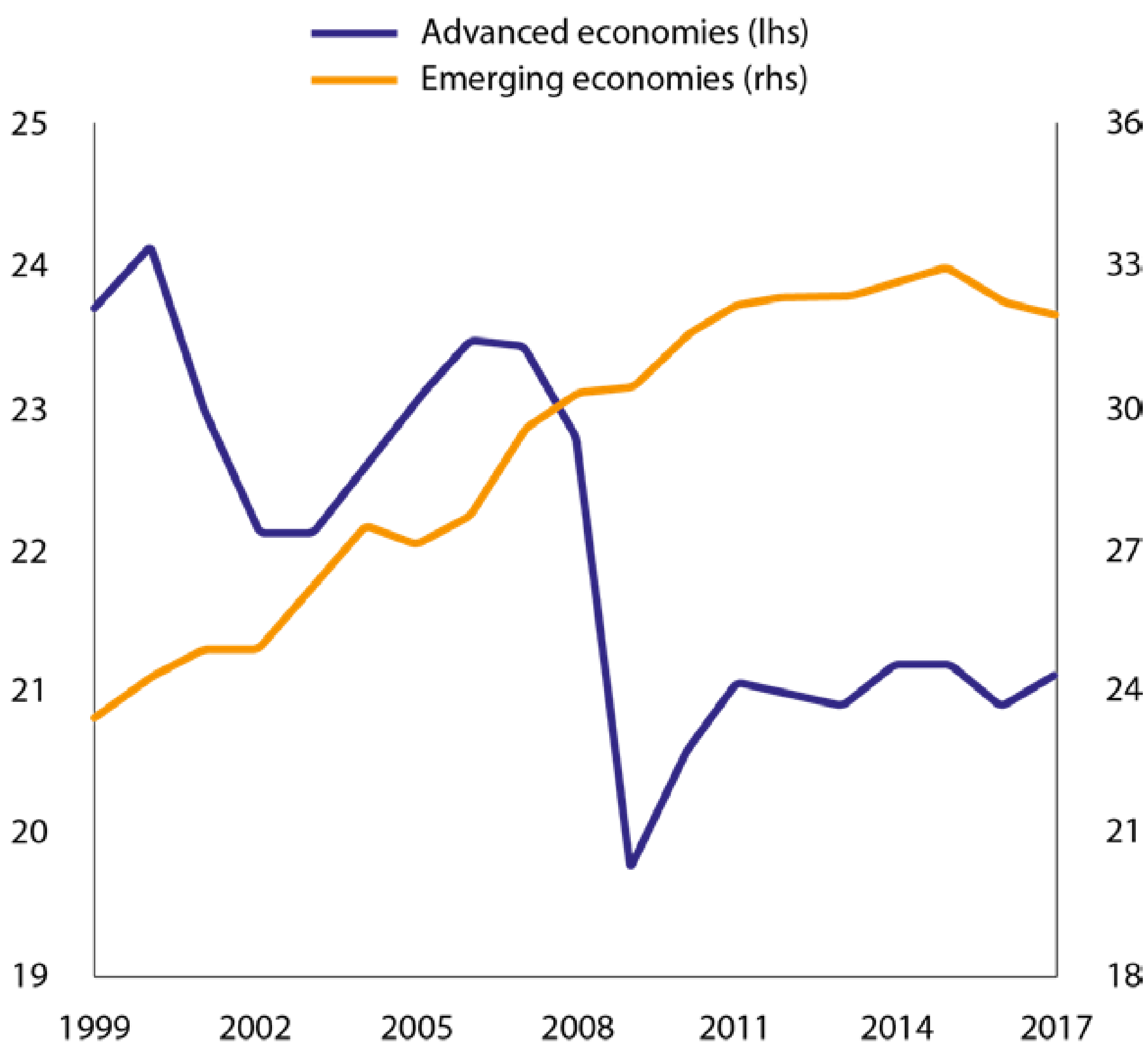
Sources: Haver Analytics and ECB calculations.
Notes: The bars show the change in the share of exports in GDP between the average of 2000Q1-2007Q4 and 2017Q3.

Figure 6. Current account balances: selected euro area countries (in percent of euro area GDP)



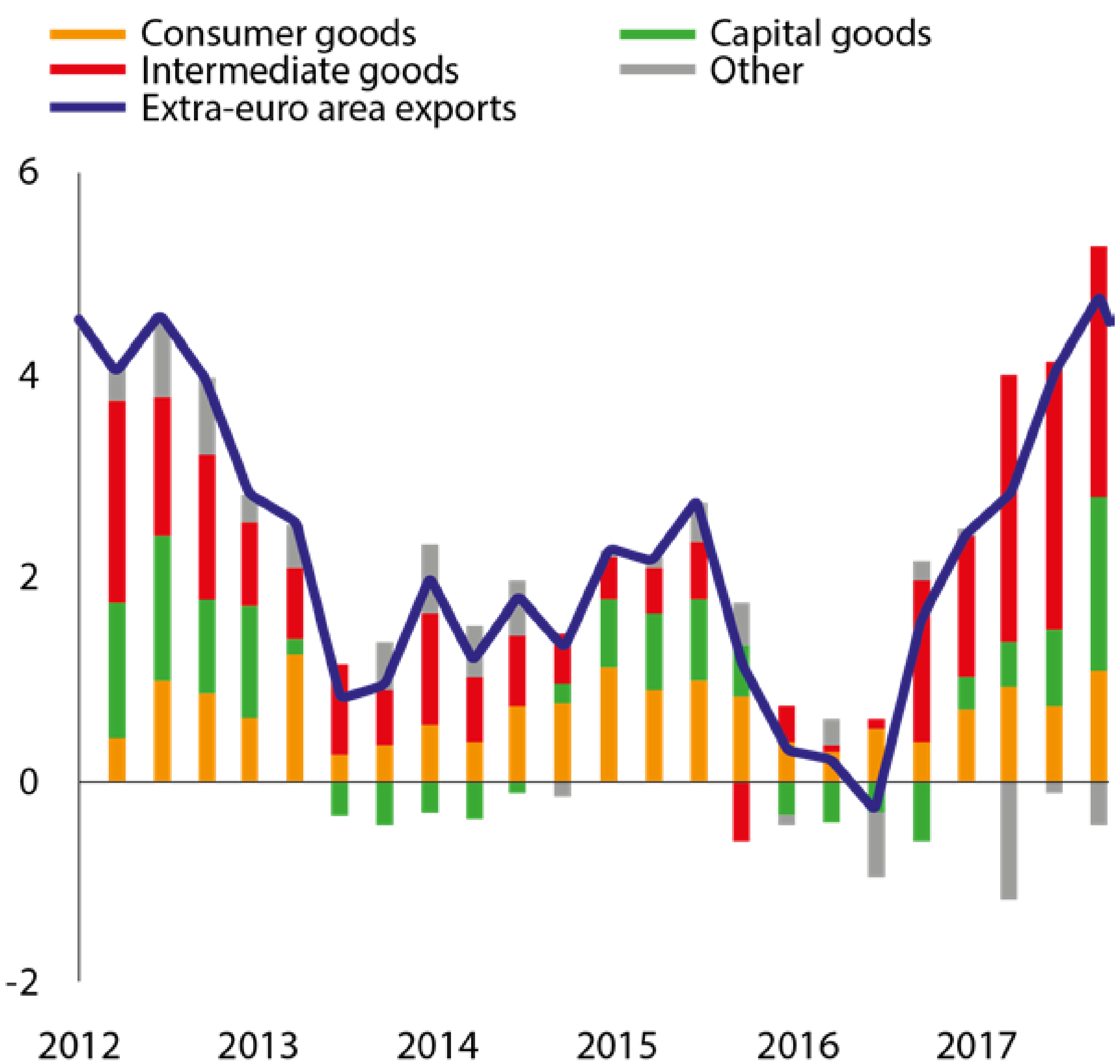
Sources: ECB and Eurostat.
Notes: Last observation is 2017Q2.

Figure 7. Investment share in GDP (in percent)



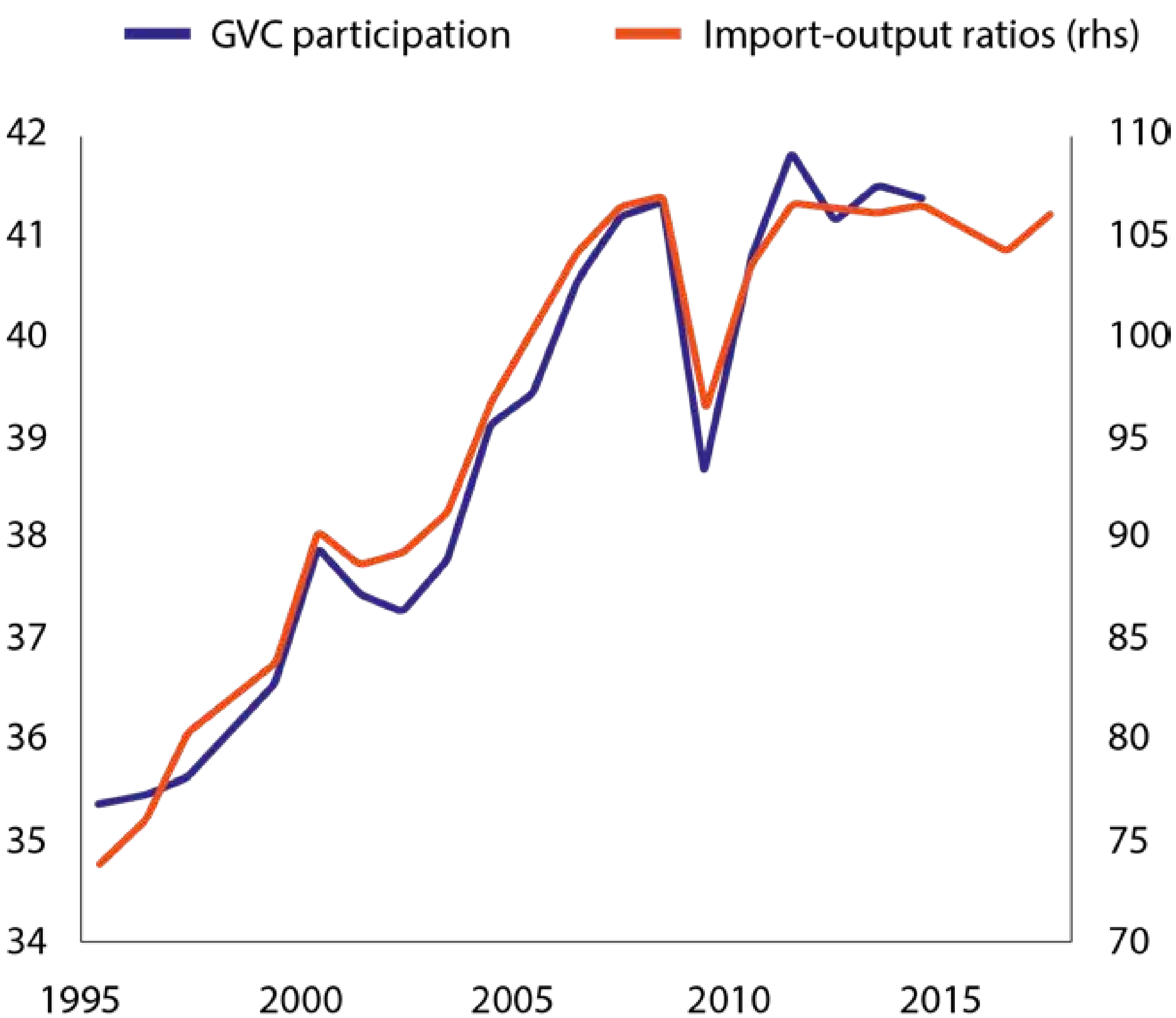
Source: IMF WEO.
Notes: Last observation is 2017.

Figure 8. Extra-euro area exports by type of goods (year-on-year percent changes)



Source: Eurostat.
Notes: Last observation is 2017Q3.

Figure 9. Global value chain participation and import-output ratio (in percent)



Sources: WIOD and ECB calculations.
Notes: Annual data. Last observation for GVC participation is 2014. For the importoutput ratio, it is 2017.

Now, does the current trade recovery bode well for the future? What are the prospects for global and euro area trade? Will we return to an environment where trade growth persistently outpaces GDP growth? In answering these questions, I will distinguish between cyclical and structural factors.

Cyclical factors affecting trade growth

As for the cyclical factors, empirical evidence suggests that economic growth alone is often not a sufficient condition for strong trade growth. Indeed, trade did not start to lift off before we saw a nascent recovery in global investment, which had weakened significantly after the Great Recession.

In Figure 7 you can see that in advanced economies the share of public and private investment in output declined sharply with the advent of the crisis and has remained well below pre-crisis levels since then. For emerging markets, the investment share had been rising but it has plateaued in recent years.

So, the composition of growth matters for trade. Investment in particular has a relatively high import intensity[1]. As a result, a slowdown in investment demand typically has a disproportionately large adverse impact on trade, relative to other GDP components. It is therefore no coincidence that the recovery in trade last year was led by exports of capital goods and intermediate goods, both key inputs to investment. You can see this clearly in the case of the euro area in Figure 8.

The implication is that future trade growth will depend to some extent on the sustainability of the current investment recovery. For sure, continued accommodative financial conditions and business optimism will continue to support investment and hence trade. The United States has also just lowered its taxation of capital, which can be expected to further boost growth in capital formation. In the euro area, investment is expected to remain robust due to rising corporate profits, high levels of expected earnings, and an increasing need to modernise the capital stock.

Indeed, according to Eurosystem staff projections, investment in the euro area is expected to increase by just over 10% until the end of 2020[2].

So, overall, we can be confident that investment growth, and the current broad-based economic expansion more generally, will continue to support international trade in the coming years.

Structural factors affecting trade growth

Yet, while the cyclical pick-up in trade remains supportive, structural headwinds may prevent rates of trade growth returning to the levels we observed in the two decades prior to the crisis. In short, empirical evidence suggests that the factors that have supported extraordinary trade growth rates in the past were special and are likely, by and large, to have run their course[3].

For example, rapid financial deepening in emerging economies, and better access to capital markets, has helped boost trade growth in the past. But research suggests that there are likely diminishing marginal effects of finance on trade growth[4]. In other words, there appears to be a threshold – when private sector credit reaches around 100% of GDP – beyond which financial deepening no longer contributes meaningfully to trade growth.

But by far the strongest factor behind the boost in trade growth prior to the crisis, but which now appears to be waning, is the international outsourcing of production processes via so-called global value chains.

I would like to focus on this factor in the remainder of my remarks. Global value chains involve production processes being split into a number of intermediate steps, mainly in order to exploit international factor income differences. As a result, production has become dispersed across countries, and mechanically increased the amount of trade that took place for a given final output. You can see this clearly in Figure 9. In the past, we have seen a close relationship between global value chain growth and the share of imports in total output.

The global integration of China, for example, not only increased its exports to developed economies, but it also increased its imports of raw materials and intermediate goods from neighbouring emerging economies. This boosted overall world trade relative to output.

However, as you can see, since the crisis we have seen a levelling-off of participation rates in global value chains. In other words, the share of global value chain related exports and imports in total trade has stabilised. This means that the support for world trade from global value chains has recently faded.

The important question to ask then is whether this levelling-off will be temporary or more permanent. In the view of ECB researchers, there are at least three factors that suggest that the slowdown in global value chain formation is likely to persist, at least in the short term.

The first factor relates to supply-chain risks. You will recall that the 2011 earthquake and tsunami in Japan caused severe supply disruptions. Some companies discovered, the hard way, that supply chains were not transparent, rather like the fault lines in securitisation that caused the great financial crisis. In short, suppliers hired sub-contractors, who themselves hired sub-contractors, and so on.

As a result, an OECD report suggests that supply chains are increasingly designed to contain risks as well as costs[5]. Often, this implies shorter and more transparent value chains. And given the intimate relation between digitalisation and trade, this trend could be amplified further in the future by rising cyber risk and risks to data integrity.

The second factor relates to shifts in comparative advantages. In the past, wage differentials for unskilled labour made the international fragmentation of production processes worthwhile. Some of those wage differentials are now less marked as emerging economies continue to develop. In China, for example, real wages have increased by a factor of ten since 1995.

The implications for trade are twofold. First, as the Chinese and other emerging market economies mature and incomes grow, there is a rising shift from investment to consumption. This results in a lower trade intensity of demand. We already see that Chinese import growth has slowed markedly.

The second implication is that outsourcing of production processes has become less profitable. In the short term, this is unlikely to unravel existing value chains that also benefit from important supplier network effects – that is, from local upstream and downstream inputs and services. But in the long run it might lead to businesses reconsidering their offshoring practices.

This brings me to my third point. Shifts in comparative advantage could simply mean that other, less developed economies will take over from the more mature economies at the lower end of global value chains, following the traditional 'flying geese' pattern. Like nomads, firms move on and global value chains move with them. Lumpy technological change could even help some of these economies leapfrog and jump directly to the most advanced stage of technology – the so-called 'advantage of backwardness'[6].

I would like to suggest, however, that the fourth industrial revolution – and the associated increase in automation and the use of artificial intelligence – may mark a move away from this model. The reason is that the increased use of robots has the potential to modify the relative factor intensities in the production of certain goods and services and may thereby sever the link between, say, cheap labour and the location of unskilled manufacturing activities[7].

Put simply, if robots can deliver the same output more cheaply, more efficiently and closer to the consumer, then firms may have fewer reasons to spread production across countries[8].

In other words, robots could turn global value chains on their head and cause firms to reconsider offshoring practices. A survey by the Boston Consulting Group, for example, revealed that more than 70% of senior manufacturing executives in the United States consider that robotics improve the economics of local production[9].

Lower automation costs are a key ingredient of this rethinking. Indeed, while the cost of labour is rising in traditional low-cost developing economies, the cost of robots has fallen sharply. By some estimates, the average price of industrial robots has declined by about 40% over the past ten years and is projected to decline considerably further[10].

And the potential for automation is enormous. A recent McKinsey report suggests that 60% of global manufacturing activities, and 81% of manufacturing hours, could be automated using existing technology[11]. This is not just a topic for the future. We are already seeing clear signs of accelerating automation.

According to data from the International Federation of Robotics, the global supply of industrial robots grew by 19% on average between 2009 and 2016. It is forecast to increase further by almost 80% by 2020, bringing the total stock of robots to around three million.

Of course, technological progress also changed the way we produced goods and services in the past. But because the current breakthroughs – just think of 3D printers, autonomous vehicles or cognitive computing – are virtually unprecedented in scope and scale, the 'march of the machines' may potentially render a significant share of the international fragmentation of trade redundant, particularly in the manufacturing sector.

The rise of automation may therefore accelerate a process that Dani Rodrik termed 'premature deindustrialisation' in developing economies[12]. This term describes a pattern whereby developing economies see their manufacturing base shrink at a level of income that is far below the level attained by advanced economies before they started to deindustrialise.

This means two things. First, the impact of reshoring and the automation of unskilled manufacturing processes on developing countries' labour markets could be significant. The International Labour Organization recently estimated that around two-thirds of jobs in the textile, clothing and footwear industry in Indonesia are at risk of automation[13]. For Cambodia, the figure is 90%.

Second, automation may become a headwind to the catching-up process of developing countries. Historically, productivity in the manufacturing sector has tended to converge to the global frontier more easily than that in other sectors. Manufacturing was thus traditionally a sector that allowed developing economies to catch up with advanced economies. China is certainly a case in point. But to the extent that automation accelerates the decline in manufacturing, it may force countries to consider the development of other growth models.

None of this is to say that technological progress is bad and should be stopped. On the contrary, if managed wisely, the fourth industrial revolution has the potential to lift global income levels and to improve the quality of our lives. After all, technological progress remains the engine of both growth and aggregate employment, although often in an increasingly disruptive way.

Historical evidence provides some cause for optimism. A recent study on German manufacturing, for example, finds that automation accounts for around a quarter of the manufacturing jobs lost between 1994 and 2014[14]. But these jobs were fully offset by higher employment in the services sector. Moreover, manufacturing workers in positions with greater exposure to robots were more likely to stay at their current workplace, although not necessarily in the same job and usually at the cost of lower wages.

Such compositional changes have taken place in the past too. For instance, the share of US employment in agriculture fell by 56 percentage points between 1850 and 2015. New technologies may bring new opportunities too. The McKinsey report I mentioned estimates that by 2030, around 10% of labour demand will be for positions that barely exist today, for example AI specialists and big data analysts[15].

This transition is unlikely to be swift or easy, however. History also provides many examples of how changes in relative sectoral demand can create large and long-lasting divergences in labour market outcomes. The European Union is a case in point. There are regions where high rates of unemployment have persisted for decades following the decline of employment in certain industries, such as coal mining and steel production.

In the end, the transition will be governed by the extent to which employment creation in new sectors keeps pace with the automation of jobs in existing sectors. And it will depend on the ability of workers to acquire new skills, and potentially to relocate geographically, so that they can transfer between sectors – and on how they can be empowered to do so.

Policy implications and conclusions

With this in mind, let me conclude with some policy implications. The first is that automation implies that protectionist policies aimed at preventing – and reversing – job losses among low-skilled workers in manufacturing are unlikely to achieve their aim.

This is because reshoring, forced or not, is ultimately the outcome of regained competitiveness and changes in relative factor intensities. Production then becomes more capital and skill-intensive and is unlikely to create many new jobs for low-skilled workers. Higher tariffs are also less effective than they were in the past, given that intra-firm trade has grown substantially. As a result, higher tariffs may well reduce domestic profitability.

In other words, policymakers need to adapt to the changing nature of global trade. As Richard Baldwin points out in his recent book, the focus on the flow of goods between countries is misplaced. The current round of globalisation relies on the flow of know-how across borders[16]. As such, whereas previous industrial revolutions tended to affect mainly low-skilled workers, the current information revolution makes even mid-skilled jobs insecure.

The second implication is that policymakers need to help new industries to grow and develop. This is particularly important for services, which already account for two-thirds of global GDP and employment, and represent many of the potential growth sectors in the age of digitalisation and automation. Research by the ESCB's CompNet research network shows, for example, that many EU services sector firms are far behind the productivity frontier[17]. Reallocating capital and labour towards more productive firms would help boost overall competitiveness and support employment.

For the EU, this means completing the Single Market for services. The same CompNet research points to the potential benefits of increased trade in services. Firms that have just started to export are, on average, about 15% more productive, 30% larger and pay 10% higher wages than non-exporting firms in the same narrowly defined sector. Not only are exporting firms more productive at the outset, they increase their productivity in their first year of exporting by more than comparable non-exporting firms[18].

But policy actions must go beyond trade initiatives. In Europe, we need comprehensive policy action, at both EU and national level, to support workers who have lost their jobs due to technological shifts and facilitate employment in emerging industries. Certainly, this involves ensuring adequate education and retraining programmes to help smooth the transition to new employment. But it also means continuing to address structural rigidities in labour markets that may prolong and amplify secular shifts in labour demand. This includes fostering labour mobility across EU countries. Freedom of movement of workers is undoubtedly an engine of growth.

But we should also be realistic. Not everyone will benefit from the technological changes, and new solutions are needed to address these challenges. Continued high structural unemployment in some European countries shows that this is an area where policymakers have not been successful in the past.

The third implication is that the challenges of automation go far beyond employment. History corroborates this view. Technological progress in the early part of the 19th century was accompanied by a long period of stagnation in real wages, even though output per worker increased sharply[19]. The late 19th century also witnessed a prolonged period of deflation brought about by technological improvement that was unpopular at the time, even though it was accompanied by strong output growth[20].

The Western Balkan economies share many of the opportunities and challenges that I have discussed. Lower GDP per capita raises the opportunity to leapfrog and jump directly to the digital economy, as well as the risk of being hurt by reshoring and premature deindustrialisation. Trade openness in the region remains below that of other comparable economies in central, eastern and south-eastern Europe. This may in part reflect institutional factors, such as the effectiveness of the judiciary system or infrastructure development needs, but may also reflect competitiveness bottlenecks, including of the type I mentioned earlier. Addressing these bottlenecks at a national and at a regional level will foster trade, improve access to new, larger markets and, ultimately, accelerate convergence and income growth in the region. ■

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Endnotes

1. See eg. Bussière, M, G Callegari, F Ghironi, G Sestieri and N Yamano (2013), "Estimating Trade Elasticities: Demand Composition and the Trade Collapse of 2008-2009," American Economic Journal: Macroeconomics 5(3): 118-151.

2. See Eurosystem staff macroeconomic projections for the euro area, December 2017.

3. See eg. ECB (2016), "Understanding the weakness in global trade: what is the new normal?", Occasional Paper No 178, IRC Task force, September.

4. Gächter, M and I Gkrintzalis (2017), "The finance-trade nexus revisited: Is the global trade slowdown also a financial story?", Economics Letters, 158(C): 21-25.

5. See OECD (2013), "Global value chains: managing the risks," in Interconnected Economies: Benefiting from global value chains, Paris: OECD Publishing.

6. See Gerschenkron, A (1962), Economic Backwardness in Historical Perspective: A Book of Essays. Belknap Press of Harvard University Press, 1962.

7. See also United Nations Conference on Trade and Development (2016), "Robots and Industrialization in Developing Countries", Policy Brief No 50.

8. In some ways, this insight is similar to the assertions made by Paul Samuelson in his famous 2004 paper, where he argued that productivity gains in one country can benefit that country alone, while permanently hurting the other country. Unlike in Samuelson's example, however, it might be developing economies that would suffer from productivity shifts *today. See Samuelson, P (2004), "Where Ricardo and Mill rebut and confirm arguments of mainstream economists supporting globalization," Journal of Economic Perspectives 18(3): 135-146.*

9. See Boston Consulting Group (2015), "Made in America, Again: Fourth Annual Survey of US-Based Manufacturing Executives", December.

10. See, eg. Sirkin, H, M Zinser and J Rose (2015), "How Robots Will Redefine Competitiveness", Boston Consulting Group, September.

11. See McKinsey Global Institute (2017), "Jobs lost, jobs gained: Workforce transitions in a time of automation", December.

12. See Rodrik, D (2015), "Premature Deindustrialization", NBER Working Paper No 20935.

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14. See Dauth, W, S Findeisen, J Südekum and N Wössner (2017), "German Robots - The Impact of Industrial Robots on Workers", CEPR Discussion Paper No 12306.

15. McKinsey Global Institute (2017), op. cit.

16. See Baldwin, R (2016), The Great Convergence: Information Technology and the New Globalization, Harvard University Press.

17. See ECB (2017), "Firm heterogeneity and competitiveness in the European Union", Economic Bulletin, Issue 2, 2017.

18. See ECB (2017), ibid.

19. See Allen, R (2009), "Engels' pause: Technical change, capital accumulation, and inequality in the British industrial revolution", Explorations in Economic History, Vol. 46(4), pp. 418-435.

20. See Bordo, M, J Lane. and A Redish (2004), "Good versus Bad Deflation: Lessons from the Gold Standard Era", NBER Working Paper No 10329.

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Overcoming zero-sum games to sustain growth and globalisation

Antonio de Lecea argues that Europe's stance on globalisation is capable of reconciling higher growth with a fairer distribution of income and opportunities

Some in the West argue that the emerging countries have prospered from globalisation at the expense of low- and middle-income classes in advanced countries by abusing open trade. Others in the East counter that the problem is the unfair distribution in Western countries of the benefits derived from global integration.

This column argues that Europe's stance on globalisation – a combination of enforcement of a level playing field at home and abroad and a welfare state that mitigates polarisation and empowers middle classes – is capable of overcoming these zero-sum stories by reconciling higher growth with a fairer distribution of income and opportunities and a multidimensional concept of sustainability and well-being.

In the US, globalisation is often blamed for allowing countries to thrive at the expense of the jobs and income of Western middle classes. Milanovic's (2016) 'elephant' graph of the global distribution of gains in real income per capita (Figure 1) can be understood in this way. It shows that between 1988 and 2008 the income of Asian middle classes increased by 60% or even 75%, while income of Western middle classes remained virtually flat.

The same chart lends itself to a very different interpretation – as a West-West zero-sum game. In this vein, China's President Xi or Prime Minister Li underline that globalisation brings benefits to both the East and West, and is wrongfully blamed for domestic issues like the unequal distribution of the gains between the 1% and the rest.

Both narratives capture some relevant features but miss important ones, and their policy conclusions do not solve the underlying problems. Below, I review these in more detail and discuss the associated policy conclusions. I then propose an alternative East-West grand bargain that builds on current EU policies.

Figure 1a. East-West zero-sum game

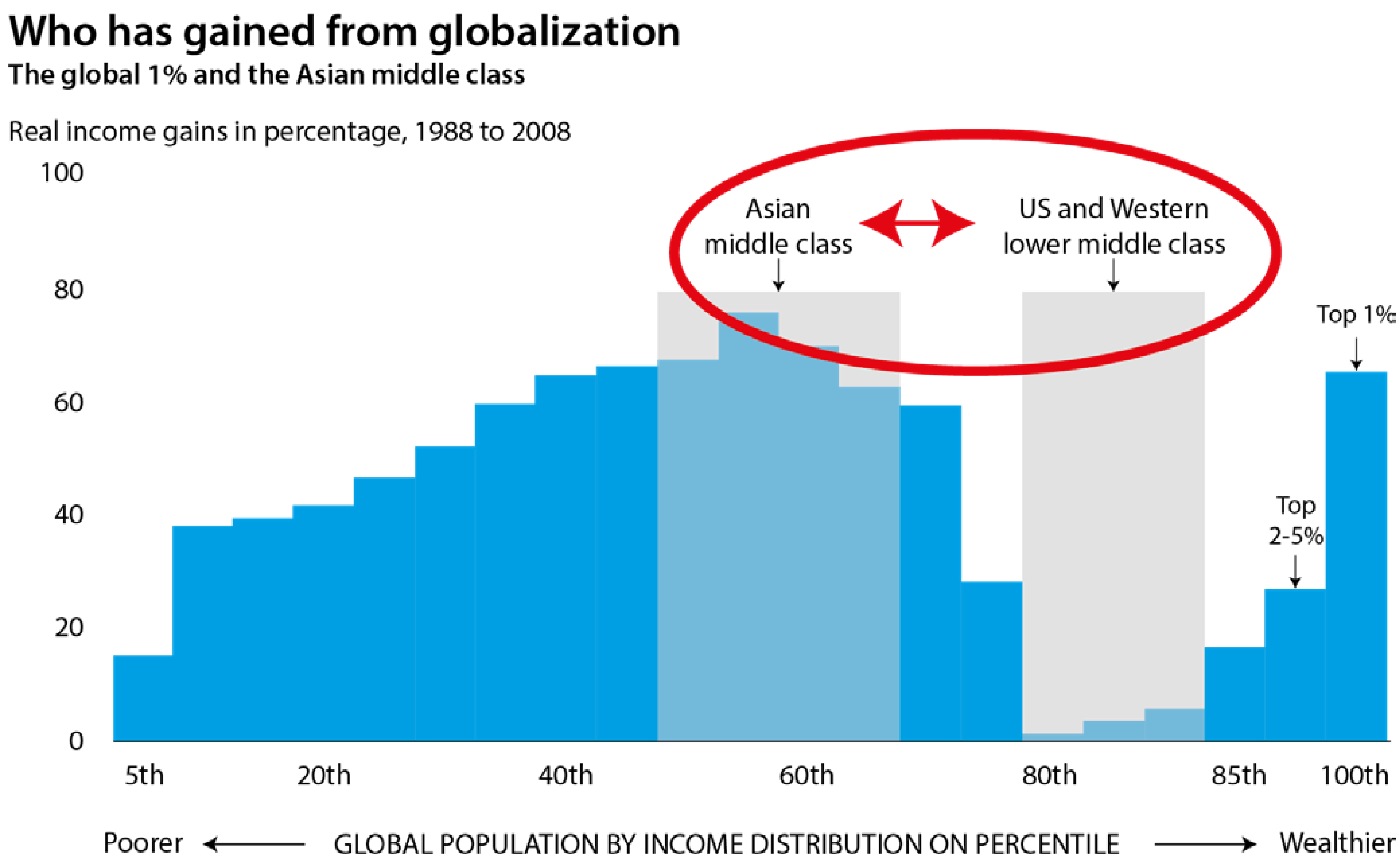
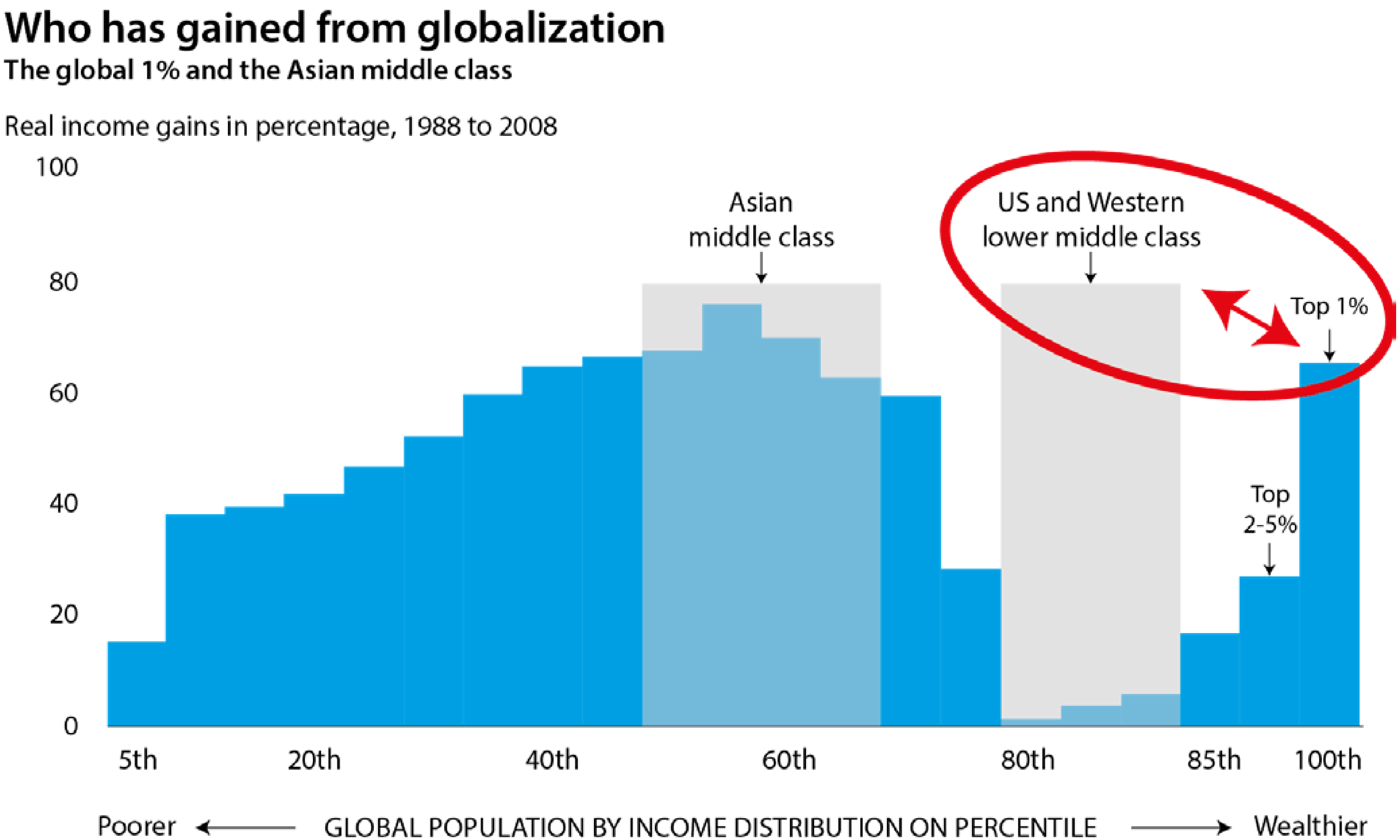


Figure 1b. West-West zero-sum game



1. Unfair growth and job displacement from West to East

Some delocalisation of jobs and activities from the West is due to the natural play of comparative advantage, and brings benefits to all in the West in the form of lower consumption prices and a wider range of products.

But protectionist policies and practices in the East exacerbate this displacement. The OECD ranks China the second-most restrictive country in terms of FDI, while Russia, China, Brazil, and India continue to be the main users of trade protectionist measures (European Commission 2017).

Growth and globalisation can become a proper positive-sum game through a grand bargain between the East and West

Maintaining measures that discriminate against foreign companies is difficult to justify with the infant industry argument when there are now as many Chinese as European firms amongst the 200 largest global companies. Protectionist practices are instead the result of deliberate industrial policies, and of regulatory capture by well-connected firms, that benefit from substantial economic rents. In spite of official reform announcements, significant distortions remain and new ones have resulted from loose domestic regulation and discriminatory enforcement.

2. The distribution of gains within the West is increasingly polarised

Eastern voices are rightly pointing out that the East and West both benefit from globalisation. Moreover, several indicators support the perception that market outcomes are increasingly unfair and insufficiently offset by fiscal policies.

Labour productivity and compensation of private sector workers before taxes grew broadly in tandem in the US until the 1970s but have increasingly diverged after that, particularly since the 2000s (Bivens *et al.* 2014).

Labour shares in GDP have also persistently declined, notably after crises, and the ratio of top salaries in major US corporations to low-skill wages rose sharply since to reach nearly 300 in 2013 (after being stable at 25-30 until the late 1980s). Education is necessary for economic and social advancement but is no longer the silver bullet, as signalled by declining real salaries of recent graduates in the US since 2000 (Davis and Mishel 2014).

3. Rent extraction and rent seeking are at the heart of polarisation

The gap between productivity and wages, and wage polarisation, are often attributed to technological change and to the growing importance of other intangible inputs. The divergence between high and low wages is partly due to the rewards to scarce talent that is capable of dealing with the increased complexity and technological content of global value chains and operations. High-performing firms and superstar managers tend to match, and thus accelerate polarisation between high- and low-productivity firms and between high-end and low salaries.

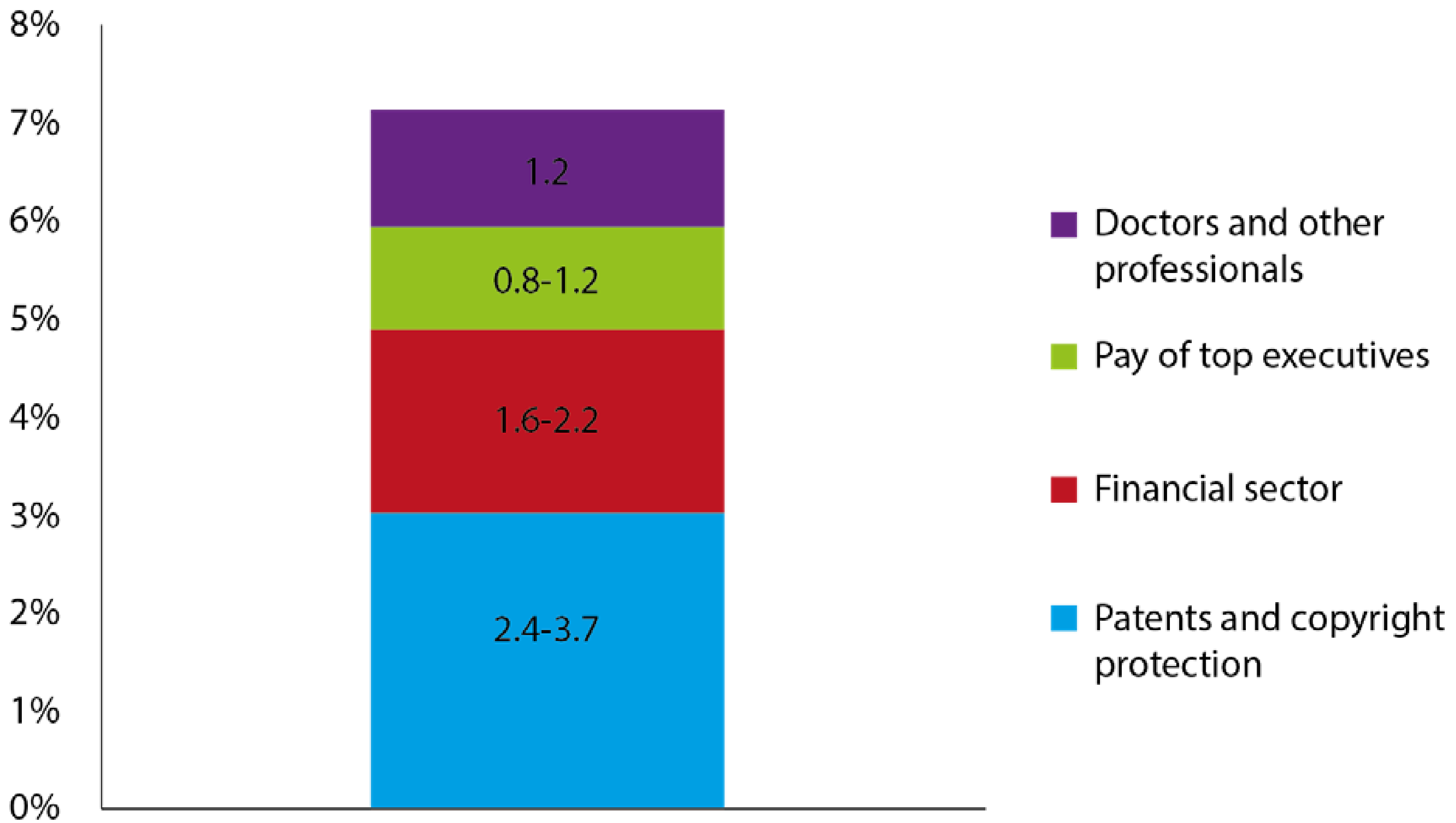
But significant rent extraction and rent seeking, particularly in specific industries and expert professions, is another explanation (Stiglitz 2013, Furman and Orszag 2015, Bessen 2016, Deaton 2018). Several indicators point in this direction. Industry concentration has increased, and mark-ups have risen from 18% to 67% between 1980 and 2014 in the US (De Loecker *et al*. 2017), while antitrust enforcement became looser and technological barriers to entry increased (Grullón *et al*. 2016). Some rents to knowledge-intensive industries may be justified by the need to provide incentives to innovation.

But beyond these cases, there is often a vicious circle of barriers to entry and market power, capture of the regulatory process, and lax competition enforcement. The bargaining power of rent-extracting firms vis-à-vis labour and governments increases with deregulation. It also expands across borders via loose trade and investment agreements.

Baker (2015) estimates that rents from patent and copyright protection, the financial sector, and top executives, doctors, and other highly educated professionals account for between 6% and 8.3% of US GDP, as illustrated in Figure 2.

The regressive impact of rent extraction in these few sectors is of the same order of magnitude as the overall effect of progressive redistribution through the fiscal system. Fiscal redistribution from the top 10% to the remaining 90% accounted for 8% of GDP in 2014, as shown in Table 1.

Figure 2. Economic rents in selected activities (% of GDP)



Source: Baker (2015).

Table 1. Fiscal redistribution, adult individuals, 2014 (% of GDP)

	Pre-tax income	Post-tax income	Redistribution
Top 10%	49.1	41.1	-8.0
Middle (50-90%)	40.2	41.8	1.6
Low (0-50%)	10.7	17.1	6.4

Source: Piketty et al. (2016)

The way forward: policies to prevent and correct market power abuse do matter

The East-West zero-sum narrative concludes that global integration must be curbed, or at least that bilateral flows must remain balanced, and recent policies in the US are consistent with this line. At the opposite end, the West-West approach pleads for globalisation to continue, hardly changed. President Xi's message to the 2017 APEC Summit to *"let more countries ride the fast train of Chinese development"* illustrates this approach.

Neither of these options is effective or sustainable. Protectionism and disengagement from global agreements will not address the US savings-consumption imbalance and the US stands to end up worse off if the unilateral trade measures escalate into a trade war. Rolling back social, financial stability, and environmental regulation will amplify domestic polarisation. It will also reduce the redistributive capacity of fiscal policies, widening the scope for rents. The lot of those left behind by globalisation is unlikely to improve.

The West-West zero-sum narrative is not a politically sustainable option either. Speeding up globalisation without correcting for unfair, protectionist policies also accelerates the excessive dislocation of jobs and activity. It will aggravate the resentment among Western low and middle classes and the likelihood of backlashes.

The G20 members agreed a more sustainable strategy towards strong, balanced, and inclusive growth. They have taken actions to increase growth and improve compensation, including structural reforms and investment initiatives, as well as measures to enhance inclusion[1]. At their latest summit meeting, G20 leaders nevertheless acknowledged that overall results fall short of the objectives set and called for further action as suggested by the OECD and World Bank (OECD-WBG 2017).

The reforms and initiatives contained in the G20 strategy are necessary but not sufficient. Without corrections to limit rent extraction, additional growth will continue to accrue to a limited few. Fiscal systems will at best offset the bias introduced by market imperfections.

The G20 strategy can be complemented with further emphasis in reducing market distortions and economic rents both domestically and internationally. A combination of growth enhancing, pre-distributive, and redistributive policies may thus bring higher sustainable, inclusive growth. Reduced economic rents would diminish the need for fiscal redistribution, and could make it more effective.

Europe can lead an East-West grand bargain

A comparison between Europe and the US confirms that the adverse redistributive effects from globalisation are not inevitable, and that adequate policies can at least mitigate them (Alvaredo *et al.* 2018). Wealth, income, and profits are less concentrated in the EU than in the US, even though inequality has also increased. This better performance results from policy frameworks that combine growth-enhancing, high standards and enforcement of regulation and competition with redistributive policies (European Commission 2017b).

The EU supports innovation, productivity, and growth. Budget guarantees and European Investment Bank loans leverage physical and intangible investments, research and innovation programmes, and education and training. The forthcoming EU midterm budgetary framework may further upgrade European financial support.

Some EU member states have taken successful measures to build skills and improve employability – such as Germany's dual vocational training, the Scandinavian flexicurity model, and Estonia's e-school system – and the EU has a European Globalisation Adjustment Fund which helps displaced workers to find new jobs or start their own businesses.

Policies to further remove internal borders open up business opportunities and reduce the capacity to appropriate economic rents. Furthermore, the EU state aid and antitrust regulations have put limits on the market power abuse of both European and international firms. These policies have the double benefit of reducing rents and removing the perception of unbalanced or unfair distribution of costs and benefits, thus reducing the resistance to structural reforms and innovation. EU countries have also been more ready to use taxes and benefits to improve fairness in the income distribution that results from market outcomes. Europe's welfare states have thus mitigated the side effects of technology and globalisation to a more considerable extent than in the US.

Similarly, along the international dimension, the EU is showing the way to keeping markets open and reaching broader, more transparent, and fairer trade agreements. Having completed the agreement with Canada, and initialled one with Japan, the EU is negotiating with all NAFTA and TPP countries except one, and also with Mercosur.

At the same time, it has increased transparency and engaged stakeholders in negotiations of international trade agreements to reduce the scope for capture by special interests, and hence distortions and cross-border rents.

It has reviewed its WTO-compliant defensive instruments against trade agreements violations. It has proposed an international tribunal on investor-to-state disputes to reconcile openness with high living standards and societal choices. It is cooperating with competition and regulatory authorities in other jurisdictions to align anti-competitive financial stability and tax policies internationally. And it is also a leader in strengthening global governance in climate and financial stability.

Conclusions

Growth and globalisation can become a proper positive-sum game through a grand bargain between the East and West where:

- the West pursues the growth-enhancing policies and deals with the unequal distribution of income and opportunities;
- the East continues its reforms to correct its imbalances, addresses domestic rents that hinder growth, and tackles the distortions to competition that put Western companies at a disadvantage; and
- the East and West both accelerate the convergence towards adequate financial stability, fiscal capacity, consumer protection, and social and environmental standards that underpin fair competition and strike a balance between common ultimate welfare goals and diverse paths resulting from societal choices.

The EU is well positioned to engage with emerging and other advanced countries to address the sources of discontent and drive this grand bargain. The G20 is the natural forum to bring it forward. If it becomes more difficult to reach consensus there, the EU and like-minded countries can complement multilateral negotiations with decisive action along regional and bilateral dimensions to achieve higher, more sustainable growth and more balanced, inclusive globalisation. ■

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Author's note: the views in this column are exclusively those of the author and should not be attributed to the European Commission. This research started while the author was 2016-2017 European Union Visiting Senior Fellow at the National University of Singapore Lee Kuan Yew School of Public Policy.

Endnotes

1. G20 members have encouraged hiring by making labour legislation more predictable (Brazil), improved gender balance in labour participation (Germany), facilitated youth placements (European Union, UK, South Africa), improved skills and employability (Canada, China, France, Italy, Turkey) and broadened active employment policies (Spain). Some countries have expanded the safety nets through more employment security (Germany), enhanced employment insurance (Canada), equal pay (Japan), pension benefits (Argentina), minimum wages (South Africa), minimum income schemes (Italy, Saudi Arabia), or supply of affordable housing (UK).

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The Growth Delusion
David Pilling

Fraser Cameron reviews The Growth Delusion, a revelatory and entertaining book by an award-winning editor of the Financial Times

Politicians love nothing better than claiming credit for economic growth. The media bombard us with every new statistic about the rise and fall of GDP. President Juncker notes that the eurozone had a remarkable 2.5% growth in 2017, the highest for a decade. President Trump's boasts about the rise of the stock market. President Xi Xinping heralds the prospect of China becoming the number one global economy.

But could our obsession with economic growth, measured by increasing Gross Domestic Product (GDP), be a danger to our democracy? During the Brexit referendum campaign, one Remain professor addressing a meeting in Newcastle in the north of England talked about the loss of GDP if Britain voted to leave. One heckler shouted 'that's your GDP mate, not ours.'

This exchange highlights the huge gap between politicians and experts on the one side and ordinary working people on the other side when it comes to describing the economy. The feelings of resentment were tapped into not only by the Brexiteers but also Donald Trump in his successful bid for the presidency in the US. Marine le Pen and other populist figures in Europe have also emphasised the distortions in our economy and played on the anger of those not benefitting from globalisation. Former French President, Nicholas Sarkozy, considered this trend could be a danger for democracy.

This is just one of the issues raised by David Pilling in his fascinating tour d'horizon of the origins, development and implications of our worshiping at the altar of GDP. Pilling explores how economists and their cult of growth have hijacked our policy-making and infiltrated our thinking about what makes societies work. In his thought-provoking and witty analysis, Pilling argues that we need to measure our economic successes and failures using different criteria. We should try and analyse what makes our economies better and not just bigger.

Pilling has covered three continents in his career with the *Financial Times* (he is currently Africa editor) and brings this wealth of experience to bear in his critical assessment of GDP as the main indicator of economic achievement. As *The Growth Delusion* explains, all concepts used in economic measurement are creatures of particular policy objectives, devised with specific uses in mind. The basis of modern economics is continuing production and consumption. But you do not need to be a Green Tree Hugger to know that this is a senseless path.

As Pilling explains, 'we live in a society where a priesthood of technically trained economists, wielding impenetrable mathematical formulas, sets the framework for public debate.' Politicians have jumped on the GDP bandwagon and debates are full of references to one country outpacing another at GDP. If only we can grow faster, argue politicians,

... this is an excellent book and one destined to shape the debate about how to improve the measurement of the economy

then we will be happier (and the politicians more likely to be re-elected!). Think of Bill Clinton's famous outburst 'It's the economy, stupid.' But as GDP has steadily risen in most of the developed world, why do we not feel happier? Populism is on the rise throughout the world (think Trump, Modi, Orban, Putin) and wealth inequality is as stark as ever.

But GDP as a measurement is very inadequate, providing a distorted view of the economy and one which is increasingly at odds with reality. With a plethora of examples from all continents, Pilling suggests that our GDP definition of growth no longer fits people's experiences. Economic growth tells us little about rising inequalities nor about huge global imbalances.

Pilling says he is not declaring war on growth but rather showing what is wrong with the measurement of growth. He suggests we need to broaden our perspective so that the image we capture is more reflective of our lives. So much of what is important to us, from clean air to safe streets and from steady jobs to sound minds lies outside its range of vision.

For centuries there was no measurement of the economy. People did not discuss or agonise over economic growth. Countries became richer if they conquered other countries. Rulers raised taxes to fund armies to try and extend their wealth through conquest. This only changed in the 20th century.

The concept of GDP was devised by Simon Kuznets, a Soviet émigré economist, who with a small team of statisticians, surveyed American industrial and agricultural activity in the 1930s. His findings were used to justify President Roosevelt's unprecedented government action in the New Deal. The concept was further refined and developed by two British economists, Richard Stone and James Meade, in order to maximise wartime production in the UK. They, in turn, built on pioneering work by John Maynard Keyes to include government spending in national income.

But this 50-year-old model has not been updated to take into account technological changes or work done on the internet. Pilling describes some of the absurd ways in which GDP is and is not measured. The work of a woman who cares for her elderly parents is not counted. But if the same woman was to carry out the same activities in a care home then it would be counted. Baby formula milk is counted as it is sold over the counter but breast milk is not. Prostitution, drugs and handling stolen goods are good for GDP.

The Office for National Statistics calculated that prostitution and drug dealing added £9.7 billion to UK GDP in 2009. But childcare, voluntary work and household activities are ignored in GDP assessments. American researchers estimated that if household cooking, cleaning, washing were counted it would add a staggering 26% to the US economy.

Pilling also explores how difficult it is to assess cross border operations, especially of multi-national companies with global supply chains. And in the developing world there are many activities that simply to not figure on the radar screen.

The transient Maasai tribe in Kenya do not appear in any GDP figures as they essentially live off their herd of cows and rarely figure in the cash economy. In essence GDP is mercenary. It does not count transactions where money does not enter the equation. It can count the sale of bottled water in a supermarket but not the economic impact of a girl fetching water in an African village.

Pilling is rightly critical of this approach which gives priority to growth maximisation without stopping to think about the costs. Our obsession with GDP has led to misguided policies (think banking de-regulation) which are now coming back to haunt politicians.

He appreciates what growth has done for so many, but argues that GDP fails to measure the world as people experience it – and what it does measure is often inaccurate. He suggests that one reason for the slow growth of the past decade is because GDP is so hopelessly outdated it cannot properly measure the economy.

The delusion of growth is revealed in the following tale illustrating the absurdity of numbers. 'Bill Gates walks into a bar. On average everyone in the room is a billionaire,' he jokes. The distribution of growth, income and wealth, what we call inequality, is at least as meaningful as GDP itself.

Having experienced the appalling pollution in Beijing at first hand, Pilling raises a critical eye as to how GDP treats the environment. Smog in China's capital is a good thing because the polluting factories create value and there is no price for pollution. The World Bank has estimated that China's GDP should be reduced by 2% a year to take into account the huge costs of environmental degradation. GDP gives no value to a green and pleasant land. At least President Xi Jinping has recognised the depth of public concern about pollution and is taking action to clean up China.

Pilling does not argue for the abolition of GDP as a measure but suggests that it should take into account measures that might better reflect welfare and wellbeing. By relying solely on GDP, politicians are accepting the basic value judgement of the growth juggernaut.

He acknowledges that some efforts have been made. The Human Development Index (HDI) promoted by Pakistani economist Mahbub ul Haq, is widely used in international development assessments. Pilling is not a fan, however of the way in which Bhutan implements its happiness policy. While it has helped preserve the environment from mass tourism, it has not made much of an impact on literacy or health provisions.

Pilling admits there are difficult issues in measuring the value added of finance and the public sector. A useful corrective would be to consider GDP per capita as a better measure as this puts people at centre. We also need to take into account measures that make our planet fit for habitation, such as curbing CO_2 emissions. There must, he concludes, be a system that gives more priority to health and sustainable development.

Overall this is an excellent book and one destined to shape the debate about how to improve the measurement of the economy. If we do not succeed then there may indeed be dire implications for our democracy. ■

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A time to share

In the euro area, discipline is of the essence, but risk-sharing is no less important, Daniel Dăianu writes

A significant economic recovery in the euro area (EA) has been underway in recent years. Nevertheless, major challenges still remain as the Banking Union (BU) is incomplete and the EA is not yet robust enough when it comes to its tools and policy arrangements. This reality is acknowledged by high-ranking European officials and key official documents (the *Five Presidents' Report* of 2015, the European Commission's *Reflection Paper* of 2017, etc) as well.

In the economies in distress, corrections have been made by implementing belt-tightening programmes and external balances have been restored to equilibrium, yet at the cost of an upsurge in unemployment; external imbalances have been *internalised*, thereby putting pressure on the social fabric and the political domestic setups. Banks, in general, are better capitalised, but the size of overall debt afflicts their balance-sheets. It should be pointed out that the current economic recovery, which includes a cyclical component, is largely reliant on ECB's non-standard policies, ie. very low interest rates and purchases of sovereign and corporate bonds. A new economic downturn will be felt again quite painfully in the EA if adequate policy arrangements are not put in place.

1. Two approaches to the reform of EA functioning

The euro area removed the currency risk, which was a big headache for the countries that formed the EU and sought deeper economic integration. The crisis of the Exchange Rate Mechanism (ERM1) speeded up the preparations for euro introduction. While, prior to the EA creation, external imbalances were corrected mainly via exchange rate adjustments (which fanned inflation) and budget cutbacks, adjustments during the current crisis have taken place via 'internal devaluations', whose costs are not necessarily lower[1]. Hence, trying to mend the EA functioning is more than warranted.

EA reforms reveal essentially two approaches[2]. One approach emphasises financial discipline and rules. In a narrow sense, this approach boils down to balanced budget executions throughout the business cycle; in a broader sense, it implies rules that would not allow public and private imbalances to get out of control.

But the financial crisis that erupted a decade ago has revealed vulnerabilities in the EA that cannot be attributed to soft budget/financial constraints alone; resource allocation in a monetary union which features large development gaps among member states comes into play strongly. This is why the emergence of bubbles and their subsequent effects have to be considered.

Only private risk-sharing schemes would not make the EA more robust. Financial markets are too fickle and produce systemic risks recurrently

The other approach to reforms focuses on 'risk sharing' within a union which is marked by heterogeneity, by member states' uneven capacity to absorb shocks. The EA is pretty diverse in this regard and the non-existence of key policy tools (eg. an autonomous monetary policy and own lender of last resort) can be a big nuisance. The fact is that, except for Greece, wide imbalances in some EA countries were caused primarily by private indebtedness, by cross-border capital flows in search of higher yields that led to speculative bubbles, to boom and bust cycles.

Across the EA, there is a so-called 'doom loop' between sovereign bonds and banks' balance sheets[3]. This loop is more of a problem when competitiveness gaps among member states are large and local banks show a proclivity for acquiring 'local' government bonds (a bias which is enhanced by the zero-risk weights for sovereigns as well)[4].

2. Risk reduction and risk sharing

The non-standard operations of the ECB (including its lender of last resort (LoLR) operations) have rescued the EA. A big question is what will happen when the ECB normalises its policy, when interest rates revert, be it very gradually, to positive real levels. Although the correction of external imbalances (deficits) should not be underestimated in judging the reaction of financial markets, it is sensible to think that the current sovereign bond spreads of the 'periphery' over the German Bunds (as a benchmark) do not illustrate member states' economic performances accurately; the ECB's operations have quite likely diminished these spreads.

Euro area creditor countries highlight the need to reduce NPL stocks (a *legacy problem*) as a *risk reduction* measure, prior to implementing a *risk-sharing* scheme (a collective deposit insurance scheme) in the banking sector. By the way, this scheme is the key missing link in the BU architecture, though considerably higher resources for the Resolution Fund would also be needed. But, over time, the flow of non-performing loans hinges, essentially, on economic performance, and not on a particular level of NPLs, which can be brought down through various means[5]. In the absence of mechanisms and instruments that foster economic convergence in the EA, NPL stocks at national level would tend to diverge widely again.

One can imagine a diversification of banks' loan portfolio that would diminish the threats posed to their balance-sheets by activities in weaker economies. However, a complete decoupling of banks from weaker member states' economies is not realistic and not welcome, and contagion effects can still be significant. And if a decoupling by banking groups were attempted, that would cause further fragmentation in the EA – where finance is largely bank-based. Moreover, there are small- and medium-sized banks whose activity remains quasi-local/national.

A concern of creditor nations is that certain EA reforms would lead to systematic income transfers to some countries, to a 'transfer union', which would call into question the political legitimacy of such arrangements. But a key distinction should be made in this respect: systematic transfers that would stick the 'financially assisted' label to some economies should be distinguished from transfers that help cushion asymmetric shocks and narrow performance gaps. This distinction chimes with the logic of the social insurance system: every income-earner contributes to a pool of resources that should be used when some contributors are in need of justified assistance, not sine die (leaving aside social benefits recipients) transfers.

It is worth mentioning, in this context, the *bailing-in* scheme (creditors' and shareholders' involvement in loss sharing, or haircuts) in contrast to the *bailing-out* scheme, with the latter being prohibited by the Treaties (as the EA was conceived). *Bailing-in* is meant to protect tax-payers from costly resolution operations. But *bailing-in* can trigger contagion effects unless it is done with utmost care - and it is not clear that implacable rules are to be applied in this respect. The ECB was forced by a grim reality to take on a de facto LoLR function from 2010 onwards; and one should not rule out bailouts under exceptional circumstances, when contagion effects may become very threatening.

If banking groups diversified their government bond portfolios while considerable competitiveness gaps persist among member states, and if sovereign bond ratings were no longer 'risk-free', a strong preference for holding safer bonds would ensue. Capital would favour better performing economies, although speculative funds would eye higher (riskier) yields. Banks would discriminate among countries, thus harming economic activity in some member states.

It can be inferred that, unless economic divergence among member states is mitigated, peripheral economies would become even more fragile once non-zero risk bonds come into being. The non-existence of proper risk-sharing schemes would only strengthen such perilous dynamics.

3. A European 'safe asset'

The need to reduce the bank-sovereign doom loop as much as possible lies at the root of attempts to come up with a European safe asset. For years now, Eurobonds have been mentioned as risk-pooling assets that would make the EA more robust. However, mutualisation of risks is rejected by creditor nations, which do not accept the idea of a 'transfer union'.

Hence the idea of a synthetic financial asset (sovereign bond-backed securities – SBBS) came up; this synthetic bond is derived from the pooling and slicing of sovereign bonds into three tranches: a senior one (deemed to be equivalent in strength to the German Bunds), a mezzanine (medium-risk) tranche, and a junior (seen as highly risky) tranche, with the latter bearing the brunt of losses in case of default (*Sovereign bond-backed securities: a feasibility study*, ESRB, Frankfurt am Main, January 2018[6]). This financial asset is intended to be attractive for banks and other financial institutions and to replace much of the current sovereign bond holdings.

But SBBS present a problematic feature: the supply of senior tranches depends fundamentally on the demand for junior tranches, and this demand is likely to fall dramatically during periods of market stress, when some member states' market access may be severely impaired. In those instances, demand will swiftly shift towards top-rated sovereign bonds, towards other safe assets. This is a weak trait of this synthetic asset. In times of crisis, the demand for solid financial assets (such as the German Bunds) would go through the roof, while the demand for periphery bonds would plummet, which would translate into a collapse in the demand for junior tranches as well.

Sure, one can envisage a variation of the composition of SBBSs as a function of member states' market access, but this would make the whole scheme extremely cumbersome to implement. The fact is that, unless market access is secured for all member states, the supply of SBBSs turns too unreliable to make them a workable asset. Moreover, were SBBSs to come into being, their volume would be too small to make much of a difference in financial institutions' balance-sheets, for the foreseeable future at least.

Apart from its functioning under conditions of market stress, the introduction of a synthetic asset (SBBS) should be judged in conjunction with a package of EA policy redesign measures. This package should cover inter alia:

- liquidity assistance available during times of market stress;
- schemes to cushion asymmetric shocks, such as an unemployment benefit scheme (as part of a 'fiscal capacity');
- sovereign debt restructuring should not be triggered automatically (some suggest that automaticity should be a condition for an ESM support programme), for it may cause panic in the markets, more fragmentation in the EA;
- rules for adjusting imbalances should not be pro-cyclical;

- the macroeconomic imbalance procedure should operate symmetrically, for both large external deficits and surplus countries[7];
- a euro-area-wide macroeconomic policy that should reflect in the fiscal policy stance over the business cycle;
- investment programmes should foster economic convergence;
- no de-reregulation of finance (as it is attempted in the US currently)

EA reform proposals must consider the transition to a steady state. A smooth transition can be hampered if reform measures disregard correlations among them; for instance, if the introduction of sovereign bond-backed securities (SBBS), or of other measures, does not take into account side-effects of setting non-zero risk weights for member states' bonds.

4. What sort of financial integration?

Financial integration in the EA, the establishment of a banking union that includes a collective deposit insurance scheme, raise a fundamental issue: whether the BU can overcome market fragmentation and economic divergence in the absence of fiscal arrangements that would enable accommodation of asymmetric shocks and foster economic convergence. Some argue that a complete BU would dispense with the need of fiscal integration in the euro area[8].

But is it sufficient for a robust economic and monetary union that risk-sharing applies to finance (banks) only? And would private risk-sharing be sufficient to cope with systemic risks in financial markets? Relatedly, it is not clear that a collective deposit insurance scheme (EDIS) would involve private money only, under any circumstances; some fiscal risk-sharing may be needed in worst case scenarios[9]. What if economic divergence persists, or even deepens, since banks may discriminate among economies not least due to perceived risks that originate in *bailing-in* schemes and other vulnerabilities? A disconnect between a Banking Union, in which 'risk-sharing' operates, and real economies is hard to imagine; if economies would continue to diverge and risk-sharing would not apply to them too, that would undermine further the EA[10].

Fiscal integration is the biggest hurdle to overcome in the EA since it calls for more than institutional cooperation; it involves institutional integration and a significant EA budget as a form of risk-sharing. But the latter leads to a huge political conundrum, as it faces strong political and constitutional constraints. And here lies a deeply going fragility in the design of the EA, in the spirit of Dani Rodrik's trilemma, namely that there can be no integration (globalisation via a 'single market') in cohabitation with an autonomous economic policy and democratic accountability at national level; something must be given up in this triumvirate.

It is fair to argue that this trilemma simplifies things and that compromises can be found. And yet, it raises a formidable challenge to the EA functioning unless financial integration is accompanied by policy arrangements and mechanisms that combat growing divergence between member states. For excessive divergence would increasingly eat into the social fabric and fuel extremism, populism, euroscepticism.

The progress of the EA, of the BU, demands a reconciliation between rules and discipline on one hand, and risk sharing[11] (private and public) on the other hand; with risk-sharing designed in such a way as to reduce moral hazard while, simultaneously, taking into account asymmetric shocks, different strengths of national budgets and of member states' economies[12]. It is noteworthy that reform proposals coming up from Berlin and Paris highlight the two approaches mentioned above. <u>But an adequate calibration between rules and risk-sharing, between private and public risk-sharing, is an open question.</u>

Only private risk-sharing schemes would not make the EA more robust. Financial markets are too fickle and produce systemic risks recurrently; the Great Recession showed that public intervention was needed, ultimately, in order to avoid a catastrophe. Unless it will get adequate risk-sharing schemes, the EA will continue to be very rigid (like the gold standard regime) and prone to experience tensions and crises recurrently. ■

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Author's note: this text presents the authors's views, which should not be interpreted necessarily as the official position of the NBR.

Endnotes

1. Willem Buiter sees the EA as a system of currency boards ("The Euro Area: Monetary Union or System of Currency Boards", Global Economics View, 19 March 2015). He argues that "profit and loss sharing" is indispensable for a viable monetary union.

2. What lies behind these two approaches is dealt with in "The Euro and the Battle of Ideas", Markus Brunnermeier, Harold James and Jean Pierre Landau, Princeton University Press, 2016. But the authors seem to downplay the role of the euro area flawed design.

3. Sovereign bonds, when they are solid assets, strengthen banks' balance sheets and vice versa; banks count on state capacity to step in, when needed, either directly or indirectly (via central banks' operations).

4. Though one can argue that in exceptional circumstances, when market access is restricted, this preference can perform *a significant shock-absorber function.*

5. As when non-performing loans in banks' balance sheets drop sharply when they are recognised as such (through write-offs), and not because the performance of the economy improves miraculously.

6. This idea was first formulated by Brunnermeier M, L Garicano, Ph, Lane, M Pagano, R Reis, T Santos, D Thesmar, S Van Nieuwerburgh, and D Vayanos, European Safe Bonds (ESBies), The Euronomics Group (2011).

7. Aging does not provide a convincing argument for rationalizing high external surpluses since this demographic phenomenon is occurring all across Europe.

8. Martin Sandbu, "Banking Union would transform Europe's politics", Financial Times, 25 July 2017; as he puts it, "Banking union mimics the fiscal risk-sharing".

9. In the US, the FDIC (The Federal Deposit Insurance Corporation) is funded by private money, but it has behind it the US Government as the most trustworthy institution (the only one that has taxation power).

10. L Bini Smaghi makes an insightful observation, that the most threatening doom-loop is between redenomination risk and sovereign risk; that this doom-loop can be contained by improving economic convergence and shock-absorbers ("Reconciling risk-sharing with market discipline", Policy Brief, LUISS, SEPE, 30 January, 2018.

11. See Benassy-Quere, A, Brunnermeier, M, Enderlein, H, Fahri, E, Fratzscher, M, Fuest, C, Gourinchas, PO, Martin, Ph, Pisani Ferry, J, Rey, H, Schnabel, I, Veron, N, Weder di Mauro, B, Zettelmeyer, J, "Reconciling risk sharing with market discipline: a constructive approach to euro area reform", CEPR, Policy Insight No. 91, January 2018.

12. How to combine market discipline with risk-sharing is an open question and the fears of what may be an inadequate calibration between the two elements is obvious in Marcelo Messori and Stefano Micossi' "Counterproductive proposals on Euroarea reform" CEPS Policy Insight, No.2018, Brussels, February 2018. Their view drew a strong rebuttal from J Pisani Ferry and J Zettelmeyer ("Messori and Micossi's reading is a misrepresentation", CEPS Commentary, 19 February, 2018. The fact is that unless adequate risk-sharing is achieved, bad dynamics in the EA would further cripple it.

Revisiting the notion of the EMF: policy and institutional issues

A European Monetary Fund would help as a financing mechanism for a sovereign debt crisis and debt restructuring, Saurabh Kumar writes

Introduction

European countries under the leadership of France and Germany have re-energized their intentions to rebuild and transform European integration project to make it more stable, deeper and by backing it with more intergovernmental institutions. The idea to create a European Monetary Fund (EMF) as a common fiscal mechanism for eurozone which was revived by German finance minister Wolfgang Schäuble last year, has got the support of German Chancellor Angela Merkel and French President Emmanuel Macron.

Macron's call for a pan-European finance minister which was also supported by Merkel's 'imagination' of a common European economy and finance minister can be viewed as an attempt to wipe out structural weaknesses in the European Economic and Monetary Union and step up deeper integration at a time when tensions are deepening in Brexit negotiations.

The idea to create the EMF was first introduced by Schäuble in 2010 and strengthened by Daniel Gros, head of the Centre for European Policy Studies, a Brussels based think tank, and Thomas Mayer, chief economist at Deutsche Bank who were working on this idea since 2009. This was the time when the eurozone was feeling the absence of financing mechanism, and an institution which can scrutinize public debt and design policies for fiscal management for the whole eurozone. Their intent was to create an institution which can act not only as a lender of last resort for countries facing financial crisis but also enable systematized default in case of unsustainable debt.

This is considerable continuity and further development of John Maynard Keynes' plan of creation of the Clearing Union which he put forward in 1942. The plan's purpose was to create an institution which can:

(a) create pressure on members whose payments become unbalanced; (b) an instrument to make bilateral arrangements redundant; and (c) a mean to restrict foreign exchange values so that symmetrical treatment of balance of payments transaction can contribute to long term growth and employment.

In this context, there are primarily two variables to examine this reinvigorated zeal to overhaul the eurozone: (1) how significant would it be from a policy perspective? and (2) to what extent these will change the configuration of European institutions?

Policy perspectives

First, divergences in GDP growth rates in eurozone has always been a cause of concern from the point of view of overall economic unity, for example, Latvia registered a growth rate of 1.6% in the first quarter of 2017 but Greece, France, Italy and the Netherlands recorded only 0.4% in the same period. In this context, the idea of EMF can act as a catalyst for various eurozone countries to converge their fiscal policies and revamping the economic governance of the eurozone where government debt and deficits are too high (See Figures 1 & 2).

... how would introducing a new institution restore that lack of trust , or will revamping old institutions and policies be enough?

However, the EMF can create the problem of moral hazard much like the International Monetary Fund (IMF). Countries that will be facing debt or exchange rate crises may fail to maintain monetary stability and fiscal discipline. If an institution like the EMF is created which will have crisis management plan and can provide loans to members even on conditionalities similar to the IMF, then it will make them fiscal extravagant as they will be expecting bailouts. In that case, the EMF will not enhance but undermine the economic stability of eurozone. This can be avoided if members agree to tie the EMF with the method of budget consolidation based on their incomes, financial arrangements, demography and fiscal vulnerabilities.

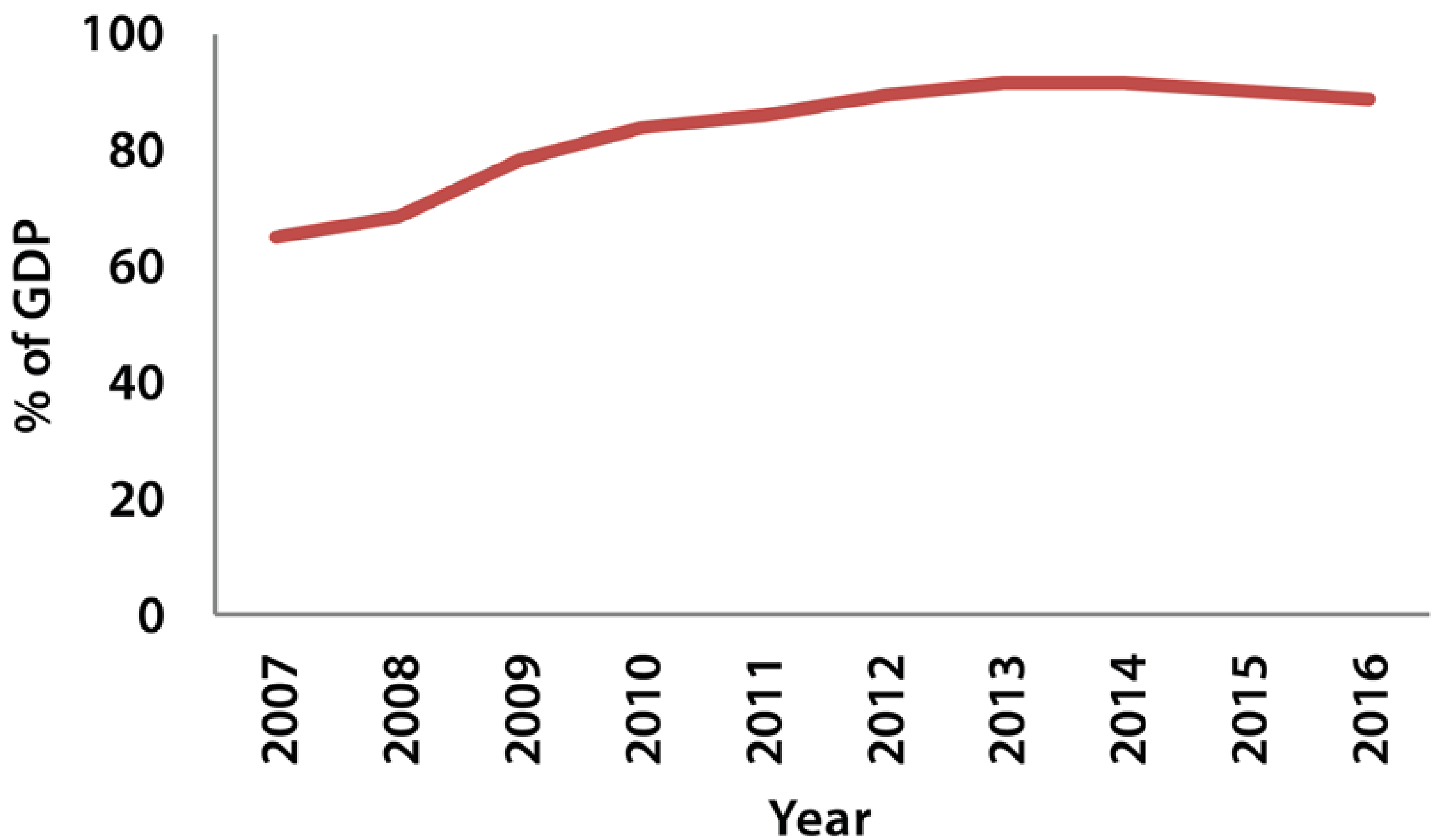
Another policy issue related to the EMF would be, whether it would adopt the model of conditionalities of IMF or will it break away from it as demanded by some of the southern European countries. The IMF's conditionalities under the Stand-By Arrangements (SBA) require more political interference and often result in social implications but if it does not have a strict framework of lending coupled with policy conditions then indebted countries will not make macroeconomic, fiscal and structural adjustments. Apart from it, flexible lending facilities as witnessed in case of Greece bailout will encourage countries to default on repayments.

Institutional issues

If EMF becomes an upgraded or extended version of European Stability Mechanism (ESM) then, it would mean shifting of public finance scrutiny power from European Commission (EC) and can result in fewer politics. However, the EU treaties, particularly Stability and Growth Pact give fiscal supervisory and prevention powers to EC. If powers of EC are cut then it will create tensions between the two institutions as crises do not occur every day but EMF will require constant involvement in fiscal supervision which will irritate the EC, European Central Bank (ECB) and national governments.

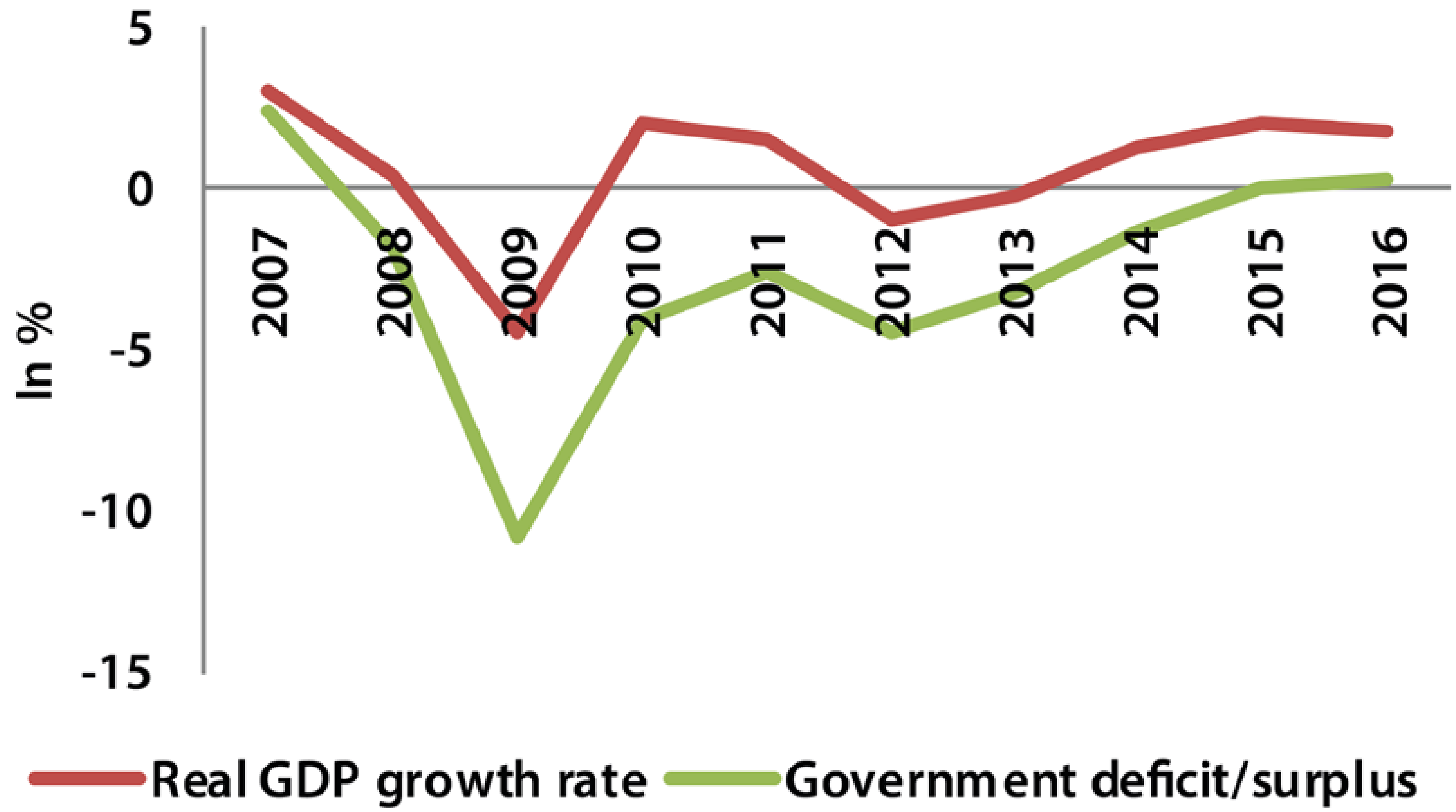
Besides, the ECB has also been given some fiscal supervision powers, particularly during the Greece crisis as a part of bailout package. In that sense, it is also collaborator with the national governments and to an extent controls na-

Figure 1. Government debt



Source: Eurostat 2017

Figure 2. GDP growth and fiscal balances



Source: Eurostat 2017

tional budgets. But if current board of ESM is given more powers but functions under the overall macro-supervision of EC then this may tone down such situation.

While on the other hand, if the EMF functions in conjunction with the ECB as a supranational intergovernmental institution, then it would require changes in a number of EU treaties which is a lengthy, hazardous and complicated process of national ratifications. Thus minor changes in the ESM treaty and other supplementary EU rules and keeping budgetary surveillance power with the ECB and EC but giving the EMF new fiscal rights is much easier and workable in short term. As far as governance of the EMF is a concern, the ESM treaty already has a provision of unanimous decisions as well as qualified majority voting system in place for the different aspect of support and conditions.

Any regional economic initiative that will work as a lender of last resort has to outline its rapport with the IMF. Jointly eurozone countries hold 22.11% quota in the IMF as against 17.46% of United States of America and much larger than any other country. And if they withdraw their financial support from the IMF reserves and invest it in the EMF, then it could result in: (a) decreased clout at global economic institutions; (b) again issue of replacing the IMF would create the problem of moral hazard within the zone; (c) consolidated but less internal finances to deal the crisis internally. But if they create it without withdrawing from the IMF, it will help them in negotiations with the IMF as they will be represented by a single fiscal policy representative in the IMF's executive board apart from the ECB. However, a lesson, in this case, can be taken from East Asia where Chiang Mai Initiative Multilateralization (CMIM) was accepted within the larger framework of IMF conditionalities to protect regional financial institutions and banks in case of crisis.

Conclusions

Although discussion on the creation of EMF is going on since last 7-8 years, yet this time it seems more feasible as both Macron and Merkel are eager to make their contribution in the history of European integration project. However, making European integration process more intergovernmental with the help of new institutions will be good for the future of EU or strengthening of existing institutions particularly at the time of increasing public scepticism, remains an unanswered question. Such an institution would certainly help as a financing mechanism for a sovereign debt crisis and also improve the crisis prevention system through more scrutinized public finances and ensuring fiscal discipline within the eurozone.

But at the same time it is also true that it is not just so simple. With regard to policy perspective, it is not only the comparison with IMF that have hampered some of the perspectives but there are real policy concerns that come from countries that are losing trust in mechanisms of fiscal handing done by the ECB and the monetary handling done by the EC. The dilemma between fiscal detachment and monetary attachment within the EU is what sometimes create mistrust between members upon new policy initiatives. It will be interesting to see in coming days, how would introducing a new institution restore that lack of trust, or will revamping old institutions and policies be enough? ■

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The views expressed are personal.

Monetary policy in the euro area
Mario Draghi says that monetary policy still needs to be patient, persistent and prudent, despite improvements in the euro area economy

Over the past year, the ECB has progressively recalibrated its asset purchase programme. We have thereby tuned our monetary policy stance to the changing pitch of the recovery – what I have previously termed *"accompanying the recovery"*[1].

During this time, the economy has developed even more strongly than we expected and confidence in the euro area has increased. But it is not because real growth is strong that we can declare the job done.

There is a very clear condition for us to bring net asset purchases to an end: we need to see a sustained adjustment in the path of inflation towards our aim, which is a headline inflation rate of below, but close to 2% over the medium term.

Thereafter, our monetary policy will have to be calibrated so as to ensure that inflation continues along this path. While we are now more confident than in the past that inflation is on the right track, risks and uncertainties remain. For this reason, even once the outlook becomes less dependent on net asset purchases, monetary policy still needs to be patient, persistent and prudent to guarantee the return of inflation to our aim.

Developments in the real economy

The economy has been growing consistently above current estimates of potential growth, by more than a percentage point last year. All euro area confidence indicators are close to their highest levels since the start of monetary union, even if the latest readings came in slightly below expectations. And there are signs of pent-up demand for both consumption and investment that still needs to be satisfied.

For consumption, one useful indicator is the gap between essential purchases, such as food and rent, and non-essential ones, such as electrical goods and holidays. Non-essential purchases – which make up around 50% of household spending in the euro area – tend to be postponed during recessions and then to catch up as the business cycle advances[2]. Such purchases are currently only 2% above their pre-crisis level, compared with 9% for essential ones. This implies that discretionary household spending still has scope to support the expansion.

Business investment is also gathering steam as uncertainty in the euro area recedes. It now stands 7% above its pre-crisis level and surveys point to continued strong investment demand: capacity utilisation in the capital goods-producing sector is close to all-time highs for the euro area and for the four largest economies. Moreover,

... the strong performance of business investment could prolong the productivity cycle and push back the time when ULC growth leads to price pressures

housing investment is still 17% below its pre-crisis level and is only now starting to pick up, which will likely add an extra impulse to the recovery dynamic.

This positive assessment of the growth outlook is reflected in the latest ECB staff macroeconomic projections. Annual real GDP is forecast to increase by 2.4% in 2018, 1.9% in 2019 and 1.7% in 2020. Compared with the December 2017 exercise, growth has been revised up for 2018 and remains unchanged for 2019 and 2020.

The strong performance of the real side of the economy is also visible in the labour market, which continues on a recovery path. With employment rising by almost 7.5 million since the trough in mid-2013[3], all of the job losses recorded during the crisis have now been recovered. The unemployment rate is the lowest since December 2008, despite a 2% increase in the labour force in that time.

There are some questions about the quality of these jobs: we have seen a rise in part-time and temporary work. But surveys point to continued employment momentum. Employment expectations are near record highs for both industry and services. We project that unemployment will fall to 7.2% by 2020.

The contribution of monetary policy to these developments has been crucial. Our non-standard monetary policy measures have had a decisive influence on credit aggregates, as well as on bank-based transmission more broadly. We estimate that the growth rate of bank lending to euro area firms would be roughly half as strong today without our measures. Bank lending rates to firms would be almost 50% higher.

These positive findings are further buttressed by survey-based evidence. In the *Bank Lending Survey*, participating banks reported that our asset purchases contributed to an improvement of their liquidity position and their market financing conditions, and indicated that they have mainly used the additional liquidity related to these purchases to grant loans. Similarly, the ECB's negative deposit facility rate is assessed by banks to have had a positive impact on their lending volumes.

These beneficial effects of our policy measures have been accompanied by improvements in direct market financing conditions and, taken together, have made a substantial contribution to the economic recovery. Considering all of the monetary measures taken between mid-2014 and October 2017, the overall impact on euro area growth and inflation is estimated, in both cases, to be around 1.9 percentage points cumulatively for the period between 2016 and 2019.

All this has also been facilitated by two further factors. The first is the strengthening of banks' balance sheets since the crisis, with CET1 ratios for significant banks rising by 580 basis points above their 2008 levels. The second is the improving the debt sustainability of both firms and households. Corporate and household indebtedness are now back to their early 2008 levels.

Developments in the inflation outlook

The key question then becomes how quickly stronger demand will translate into rising prices. Both the ECB staff projections and those of other international institutions suggest that inflation is moving in the right direction, over the medium-term horizon that is relevant for monetary policy. The latest ECB projections foresee a pickup in headline inflation from an average rate of 1.4% this year to 1.7% in 2020.

This is the latest in a sequence of projection vintages with relatively similar end-points. This stands in contrast with the disinflationary period from 2012 to 2015, where we saw continuous downward revisions to the inflation profile from one projection round to the next. But there are reasons why we still need to firm our confidence in this forecast.

In particular, the performance of underlying inflation remains subdued compared with previous recoveries. Looking at a broad range of measures of underlying inflation, we certainly see an upward shift relative to the lows of 2015. But most measures have yet to show convincing signs of a sustained upward trend.

This is relevant because underlying inflation provides the slow-moving trend that exerts a pull on wage- and price-setting in the medium term. Measures of underlying inflation can therefore provide information about the medium-term 'attractor' to which headline inflation will gravitate once short-term shocks have faded out[4].

There are two factors that might explain why the reaction of underlying inflation to a strengthening economy is slower than in the past.

First, the responsiveness of inflation to slack has weakened in recent years – a phenomenon we have seen across advanced economies as they recover from the crisis. Comprehensive analysis by the Eurosystem suggests this disconnect should be temporary, as cyclical forces linked to the crisis have been the main driver[5]. But it is still uncertain how persistent the effects of these forces might be.

Second, the degree of slack itself is uncertain. Even if slack is now receding, estimates of the size of the output gap have to be made with caution. Strong growth may be leading to higher potential output, as crisis-induced hysteresis may be reversed in conditions of stronger demand. And the effects of past structural reforms, especially in the labour market, may now be showing up in potential output.

For example, three-quarters of employment growth over the recovery has come from older workers and more than half from women. This is in part because past labour market reforms have encouraged both groups to enter the workforce in response to higher growth[6]. If substantially more workers can be drawn into the labour force, it would be possible for the labour market to strengthen further without generating wage pressures.

In this environment, policymakers have to be more cautious than in the past about the assumptions that underpin our forecasts – and simple policy rules based around estimates of the output gap are no longer a useful guide for our actions. The severity of the crisis means that we cannot rely exclusively on traditional historical relationships to determine how quickly real developments will be passed through into nominal ones.

The key issues we need to examine are wage dynamics, their pass-through to prices, and the possible risks to the inflation outlook. Wage growth has been trending upwards for the euro area as a whole, rising by 0.5 percentage points from the trough in mid-2016[7]. But consistent with the weakening of the relationship between slack and inflation, the adjustment of wages during the recovery has so far been atypically slow.

That said, our analysis suggests that, as the cycle advances, the standard wage Phillips curve should hold better for the euro area on average. The unexplained residuals in the model – which in the past were sizeable – are diminishing, suggesting the link between unemployment and wages should improve.

Moreover, the anchors for wage formation are gradually becoming more aligned with our inflation objective. Backward-looking factors appear to be becoming less important, and the forward-looking anchor, inflation expectations, is strengthening.

Phillips curve decompositions find that past low inflation dragged down wage growth from its long-term average by around 0.2 percentage points each year between 2014 and 2017. But these same analyses suggest that, as headline inflation recovers to more normal levels, the impact of past low inflation on wages could be waning.

In terms of the pass through from wages to prices, the signals remain mixed. As wages have picked up, labour productivity has also recovered. Labour productivity grew by 0.5 percentage points in 2017, more than offsetting the increase in compensation per employee in the same period. This has in turn caused the growth rate of unit labour costs (ULC) to slow, leading to questions about how quickly we can expect rising wages to feed through into inflation.

There are reasons why this phenomenon might be temporary. For example, in conditions of stronger demand, productivity tends to accelerate initially because GDP rises more strongly than capital and labour inputs, since it takes time to hire more staff or invest in new machinery. But as these inputs catch up, productivity growth typically slows, and wage pressures translate into higher ULCs.

At the same time, after a long spell of very weak capital formation, the strong performance of business investment could prolong the productivity cycle and push back the time when ULC growth leads to price pressures.

So this is an issue we will have to monitor closely, especially in an environment where one has to be cautious about extrapolating past relationships into the future. To build confidence that inflation dynamics are on track, we will need to see the actual data improving over time, which means stronger evidence of both strengthening wage growth and wage growth translating into ULC growth.

Moreover, there are still two risks to the outlook that could – if they intensify – conspire to reduce our confidence in the inflation path. The first risk relates to the global environment, and in particular the possible spillovers of the new trade measures announced by the US administration.

Our own internal estimates suggest that the first-round effect on the euro area of the proposed measures is likely to be small, even if there is symmetric retaliation from US trading partners. But there are potential second-round effects that could have much more serious consequences. These include the risk of retaliation across other goods and an escalation of trade tensions; and the potential for negative confidence effects, which would weigh on business investment in particular.

The second risk relates to developments in foreign exchange markets and wider financial markets. The euro has appreciated since the beginning of last year, and according to our analysis, this has recently been driven more by exogenous factors – that is, purchases of euros that cannot be explained solely by the economic expansion. This might weigh on inflation down the line as it does not fully arise from stronger euro area fundamentals. So this is a development we need to monitor closely.

In terms of wider financial markets, the volatility we saw in February has so far remained concentrated in equities, and the spillovers to other asset classes in the euro area that are more correlated with sentiment indicators has been moderate. But should there be any further sharp repricing in financial markets, we will need to monitor the consequences carefully.

Implications for monetary policy

So what does this mean for the sustained adjustment in the path of inflation, which is the key condition for bringing net asset purchases to a gradual end?

A sustained adjustment is a forward-looking concept, consistent with the medium-term orientation of our monetary policy framework. It is not determined by the latest flow of data or the performance of any specific indicator of price pressures.

Rather, we have to look through short-term price fluctuations and focus on how inflation will develop at the end of a medium-term horizon. This means a span of time that is not too short – as monetary policy cannot control inflation in the near term – and that is not too long, because our commitment to our inflation objective has to be verifiable. Specifically, a sustained adjustment requires three conditions to be in place.

The first is convergence: headline inflation has to be on course to reach our aim over a meaningful definition of the medium term. The second is confidence: we need to be sure that this upward adjustment in inflation has a sufficiently high probability of being realised. The third condition is resilience: the adjustment in inflation has to be self-sustained even without additional net asset purchases.

As I said, successive rounds of projections give us comfort that inflation is on a rising path and is converging toward our aim in the medium term. As for the second criterion, the confidence interval of our baseline projections has both narrowed and become less skewed on the downside. Nevertheless, the upward trend of inflation is still subject to some degree of uncertainty and downside risks have not disappeared. And this trend is still dependant on quite some amount of monetary policy support.

This is why the fundamental conditionality built into our reaction function, which makes the horizon of the asset purchase programme conditional on a sustained adjustment in the path of inflation, remains in place.

At present, our policy stance is made up of three main elements: the flow of net asset purchases, the stock of outstanding bonds and principal reinvestments, and our forward guidance on the future path of key policy rates. But it is evident that the relative importance of the different elements will evolve over time, in three key ways.

First, net asset purchases remain necessary for now to validate the stimulus that is already priced into key indices of financial conditions and on which the inflation path depends. Thereafter, when progress towards a sustained adjustment in the path of inflation is judged to be sufficient, net purchases will come to an end. At that point, next to our forward guidance, appropriate financial conditions will be maintained by our reinvestment policy.

Re-investments will ensure a continued presence in the market, long after net asset purchases expire. The cumulative redemptions under the asset purchase programme between March 2018 and February 2019 are expected to be around €167 billion. And reinvestment amounts will remain sizeable thereafter.

Second, as regards the evolution of our policy rates beyond the end of our net purchases, we will maintain the sequencing that is currently set out in our forward guidance, namely our pledge to keep key interest rates at their current levels 'well past' the end of net purchases. This time-based element of our guidance is already vital today, in particular to ensure that our policy stimulus is not weakened by premature expectations of a first rate rise, and so financial conditions remain consistent with inflation convergence.

Third, as we move forward in time, the anchor for monetary policy, and the main tool for shaping the stance, will become the path of our key policy rates and forward guidance about their likely evolution. Our forward guidance has assured in the past, and continues to assure today stability to the short-end of the curve. As such, our communication, and rate path itself, will be calibrated to ensure that inflation continues to evolve along a trajectory that is consistent with the sustained adjustment path.

Adjustments to our policy will remain predictable, and they will proceed at a measured pace that is most appropriate for inflation convergence to consolidate, taking into account continued uncertainty about the size of the output gap and the responsiveness of wages to slack.

We have proven in the past that our forward guidance is credible. This has been the case both for our guidance on rates and on our reaction function, notably when we laid out the contingencies that would justify launching an asset purchase programme in response to a too-prolonged period of low inflation[8].

Conclusion

To conclude, we currently see inflation converging towards our aim over the medium term, and we are more confident than in the past this convergence will come to pass.

But we still need to see further evidence that inflation dynamics are moving in the right direction. So monetary policy will remain patient, persistent and prudent. ■

Mario Draghi is President of the ECB

Endnotes

1. Draghi, M (2017), "Accompanying the economic recovery", speech at the ECB Forum on Central Banking, Sintra, 27 June 2017.

2. This relationship is based on evidence from France and Finland in the 1980s and 1990s. For similar evidence from the United States, see McCarthy J. (2017), Discretionary Services Spending Has Finally Made It Back (to 2007), Liberty Street Economics, Federal Reserve Bank of New York.

3. Data until 2017Q3.

4. For further details, see Box 7 entitled "The relationship between HICP inflation and HICP inflation excluding energy and food", ECB Economic Bulletin, Issue 2/2016.

5. See "Low inflation in the euro area: Causes and consequences", ECB Occasional Paper Series, No 181, January 2017.
6. Bodnár, K (2018), "Labour supply and employment growth", ECB Economic Bulletin, Issue 1/2018.
7. All data on wages, productivity and GDP deflator components are until 2017Q3.
8. See speech by Mario Draghi, Monetary policy communication in turbulent times, at the Conference De Nederlandsche Bank 200 years: Central banking in the next two decades, Amsterdam, 24 April 2014.

This article is based on a speech given at the ECB and Its Watchers XIX Conference organised by the Institute for Monetary and Financial Stability, Frankfurt, 14 March 2018

The future of money

Cryptocurrencies such as Bitcoin should be regulated to crack down on illegal activities and protect the financial system, Mark Carney warns

“Everyone can create money; the problem is to get it accepted” – Hyman Minsky[1]

Figure 1. A £20 banknote

This £20 note is significant. Significant because it honours Adam Smith, the great moral philosopher and hero of the Scottish Enlightenment. Significant because it is a significant amount of money, enough to buy you a burger and a few pints, or if you fancy a quieter but highly stimulating night in, copies of Smith’s *Wealth of Nations* and *The Theory of Moral Sentiments*. Significant because without money the decentralised exchange of Smith’s invisible hand could not operate. Money unlocks the specialism of labour in the pin factory and *"the great increase in the quantity of work that results."*[2] And only money can solve the coincidence of wants between the butcher, the brewer, the baker and the student on a Friday evening[3].

Many of you probably don't see Adam Smith notes too often, because you use electronic forms of money such as debit cards and mobile phones for your everyday purchases and go online for your larger ones.

A number of you may hold other forms of electronic money – crypto or virtual currencies such as Bitcoin, Ether or Scotcoin. And a few may view paper money – even the Bank of England itself – as archaic vestiges of an old centralised order of payments that will soon be swept aside by a digital, distributed future.

And that's my topic: the future of money. Specifically, how developments in money and payments technologies could transform our economy in ways good and bad. And how, for the good of the people of the United Kingdom, the Bank of England is helping to manage the potential risks and to realise the promise of the future of money.

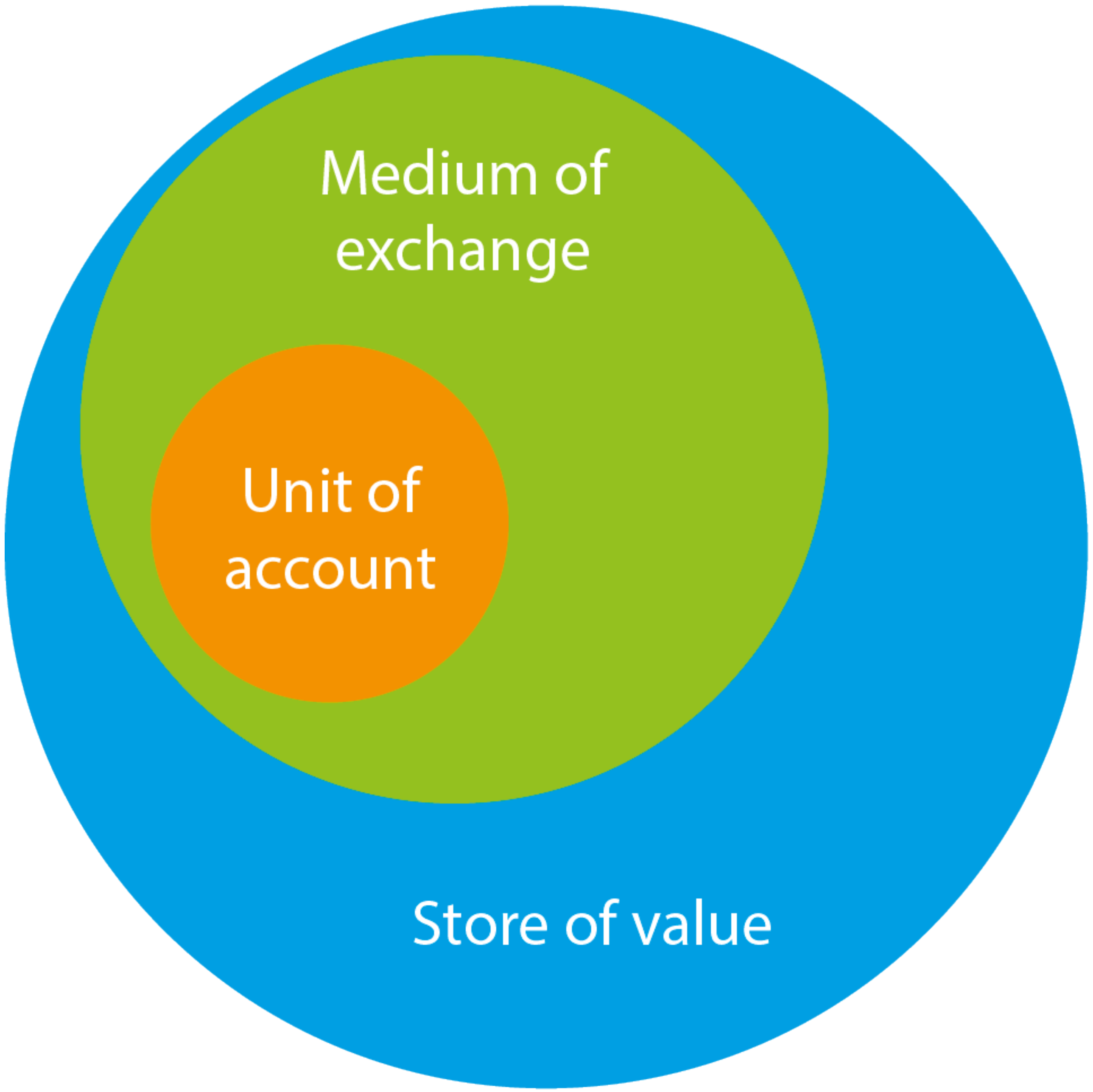
What is money?

In *The Wealth of Nations*, Adam Smith defines money by the roles it plays in society, in particular, how well it serves as:

- A store of value with which to transfer purchasing power from today to some future time;
- A medium of exchange with which to make payments for goods and services; and
- A unit of account with which to measure the value of a particular good, service, saving or loan.

These functions of money operate in a hierarchy (see Figure 2). There are many assets that people view as stores of value — houses, for instance — that are not used as media of exchange. By comparison, an asset can only act as a

Figure 2. The three functions of money



medium of exchange if at least two people are prepared to treat it as a store of value, at least temporarily. And for an asset to be considered a unit of account, it must be able to be used as a medium of exchange across a variety of transactions over time between several people[4].

The hierarchy points to the reality that money is a social convention. We accept that a token has value whether made of metal, polymer or code because we expect that others will also do so readily and easily.

The tokens representing money have taken many forms over the millennia from cowry shells in ancient times to cigarettes during the Second World War and mobile phone minutes in modern Kenya.

Bringing crypto-assets onto a level regulatory playing field could also catalyse private innovation to create a more resilient, effective payments system

And so it was when the Bank of England was founded in 1694 by a Scot, William Paterson. Originally its mission (*"to promote the good of the people"*) was fulfilled by issuing hand-written banknotes, backed by and exchangeable into gold, to help finance King William III's war with France.

By the late eighteenth century, fears of renewed Anglo-French conflict contributed to runs on the Bank which drained its gold reserves and led to the suspension of convertibility of its notes into gold. This prompted an MP to describe the Bank as *"an elderly lady in the City who had…unfortunately fallen into bad company".* To this day, the Bank of England is known as the Old Lady of Threadneedle Street.

It was not until the 1844 Bank Charter Act that the Bank of England's note issuance responsibilities were formalised and the rights of others to issue notes in England and Wales began to be phased out[5]. Today the Bank is the sole issuer of banknotes in England and Wales, while a number of Scottish and Northern Irish banks can issue notes provided that they are backed by Bank of England notes or funds on deposit at the Bank of England[6].

Most forms of money, past and present, have nominal values that far exceed their intrinsic ones. And this gap has meant that money has a long and sorry history of debasement. Over the centuries, forms of private money, such as the notes issued by American banks during the free banking of the 19th century, have inevitably succumbed to oversupply and eventual collapse.

Adam Smith worried about the potential debasement of public money and for good reason. Throughout history, governments would often betray the trust of their citizens be it Henry VIII reducing the precious metal content of his coins during the Tudor era, Pitt the Younger depleting the gold vaults of the Old Lady during the Regency period, or a pliant Reichsbank financing the government in Weimar Germany.

With the wisdom borne from such sad experience, most countries have now settled on centralised, public fiat money backed by robust institutions in order to provide the public with money that is both highly trusted and easy to use.

To understand the breadth of institutions needed for good money, it is important to recognise that modern money takes three forms that are linked by retail and wholesale payments systems. Each link in the chain is critical to the resilience of money. The first form of money is the banknotes issued by central banks, such as the Adam Smith £20s. These account for just 3% of the stock but 40% of all consumer transactions[7].

Next is electronic central bank money in the form of the reserves that commercial banks hold with us, including to settle transactions with one another. Finally, and most significantly, the electronic deposits that commercial banks create when they extend loans to borrowers, accounting for fully 80% of money in the system[8].

The private financial sector cannot create money without limit, but is disciplined by competition, constrained by prudential regulation, and limited by decisions of households and companies that can reduce the stock of money (by, for example, repaying existing debt).

Monetary policy is the ultimate limit on money creation because it directly influences the price of money and other financial assets and therefore the demand for the money created by the private sector[9]. Most of the institutions that underpin sterling's effectiveness as money are now housed in the Bank of England[10]. In particular:

- Our commitment to the highest quality banknotes that you and the publican can use with confidence. That paper £20 note contains sophisticated counterfeit protections ranging from holographic images to ultraviolet features, which will be further enhanced when we switch to a polymer £20 in 2020[11];

- The foundation of the payments system, RTGS, which processes over £600 billion of bank-to-bank payments per day to the highest standards of efficiency and resilience[12];
- The Monetary Policy Committee which conducts monetary policy independently to achieve price stability defined by the 2% inflation target;
- The Prudential Regulation Committee which is charged with ensuring the safety and soundness of the banks and building societies that hold your money;
- The Financial Policy Committee with its wide powers to maintain the resilience of the financial system as a whole; and
- The Bank's powers and facilities that provide a wide range of liquidity to banks and other financial institutions in order to promote the continuous functioning of the financial system during shocks.

The Bank has been given clear remits by Parliament for these responsibilities and has operational independence to use its powers to achieve them. We are accountable to Parliament and the people for our performance.

The combination of this robust institutional framework and the fact that only sterling is legal tender in the UK sets a very high bar for competing forms of money to dislodge sterling.

But at present, more than a thousand virtual or 'crypto' currencies are trying to do just that.

The advent of cryptocurrencies

In the depths of the global financial crisis, the coincidence of technological developments and collapsing confidence in some banking systems sparked the cryptocurrency revolution. Its advocates claim that a decentralised cryptocurrency, such as Bitcoin, is more trustworthy than centralised fiat money because:

- Its supply is fixed and therefore immune from the age-old temptations of debasement;
- Its use is free from risky private banks; and
- Those who hold it can remain anonymous and therefore free from the ravenous eyes of tax authorities or worse still law enforcement.

Some also argue that cryptocurrencies could be more efficient than centralised fiat money because the underlying distributed ledger technology cuts out intermediaries like central banks and financial institutions and allows payments to be made directly between payer and payee[13, 14].

In this spirit of dystopian fear and libertarian optimism, the message accompanying the first or genesis Bitcoin block read: *"The Times 3 Jan 2009 Chancellor on brink of second bailout for banks."*

How well do cryptocurrencies fulfil the roles of money?

The answer has to be judged against the functioning of the entire cryptocurrency ecosystem (which extends beyond the currencies themselves to the exchanges on which cryptocurrencies can be bought and sold, the miners who create new coins and verify transactions and update the ledger, and the wallet providers who offer custodian services).

The long, charitable answer is that cryptocurrencies act as money, at best, only for some people and to a limited extent, and even then only in parallel with the traditional currencies of the users. The short answer is they are failing.

Poor stores of value

Cryptocurrencies are proving poor short-term stores of value. Over the past five years, the daily standard deviation of Bitcoin was ten times that of sterling. Consider that if you had taken out a £1,000 loan in Bitcoin last December you'd be short about £500 right now. If you'd done the same last September, you'd be ahead by £2,000. That's quite a lottery. And Bitcoin is one of the more stable cryptocurrencies. Indeed, the average volatility of the top ten cryptocurrencies by market capitalisation was more than 25 times that of the US equities market in 2017.

This extreme volatility reflects in part that cryptocurrencies have neither intrinsic value nor *any external backing*. Their worth rests on beliefs regarding their future supply and demand—ultimately whether they will be successful as money.

Thus far, however, rather than such a sober assessment of future prospects, the prices of many cryptocurrencies have exhibited the classic hallmarks of bubbles including new paradigm justifications, broadening retail enthusiasm and extrapolative price expectations reliant in part on finding the greater fool.

Far from being strengths, the fixed supply rules of cryptocurrencies such as Bitcoin are serious deficiencies. Fundamentally, they would impart a deflationary bias on the economy if such currencies were to be widely adopted[15]. If *"those who cannot remember the past are condemned to repeat it"*[16], recreating a virtual global gold standard would be a criminal act of monetary amnesia.

In the short run, the fixed supply of Bitcoin has fed a global speculative mania that has encouraged a proliferation of new cryptocurrencies. As my colleague Agustin Carstens has argued, this surge of competitors and the 'forking' of Bitcoin echoes the debasement of private monies in the past[17].

Inefficient media of exchange

The most fundamental reason to be sceptical about the longer-term value of cryptocurrencies is that it is not clear the extent to which they will ever become effective media of exchange.

Currently, no major high street or online retailer accepts Bitcoin as payment in the UK, and only a handful of the top 500 US online retailers do.

For those who can find someone willing to accept payment for goods and services in cryptocurrencies, the speed and cost of the transaction varies but it is generally slower and more expensive than payments in sterling. That's because the more heavily used cryptocurrencies face severe capacity constraints compared with other payment systems. For example, Visa can process up to 65,000 transactions per second globally against just 7 per second for Bitcoin.

And if you use a debit or credit card in the UK, the transaction is completed in seconds and without exchange rate risk. In contrast, Bitcoin users can face queues of hours. Those wanting to get to the front to make time-pressing payments – for last orders, for example – need to offer up a transaction fee sufficiently large to persuade Bitcoin 'miners', who verify and process transactions, to do so quickly. The fees paid vary through time, but reached £40 in late 2017. Fees are currently around £2, but even that is expensive relative to cash, cards or online payments which cost the retailer around 1.5 pence, 8 pence and 19 pence respectively[18].

Over time, Bitcoin transaction fees could rise further because the subsidy miners enjoy by being partly paid with rewards of new units of currency, will decline given the total supply of Bitcoin cannot exceed 21 million[19]. Furthermore, the costs of Bitcoin mining are enormous. Its current annual electricity consumption is estimated by some to be up to 52 terawatt hours, double the electricity consumption of Scotland[20]. In comparison, the global Visa credit card network's energy use is less than ½ of 1% of that of Bitcoin, despite processing 9,000 times more transactions[21].

Virtually non-existent units of account

Given that they are poor stores of value and inefficient and unreliable media of exchange, it is not surprising that there is little evidence of cryptocurrencies being used as units of account. Retailers that quote in Bitcoin usually update at very high frequency so as to maintain stable prices in traditional currencies such as US dollars or sterling. The Bank is not aware of any business that accepts Bitcoins in payments that also maintains its accounts in Bitcoin.

The policy response

Even though their prospects of replacing fiat money are tenuous at best, cryptocurrencies are of growing interest to policymakers, many of whom prefer to term them crypto-assets expressly because they are not true currencies—a convention I will adopt for the balance of my remarks.

On the upside, as I will come onto in a moment, some of the underlying technologies are exciting. Whatever the merits of cryptocurrencies as money, authorities should be careful not to stifle innovations which could in the future improve financial stability; support more innovative, efficient and reliable payment services as well as have wider applications[22].

On the downside, at present, crypto-assets raise a host of issues around consumer and investor protection, market integrity, money laundering, terrorism financing, tax evasion, and the circumvention of capital controls and international sanctions.

The Bank of England's FPC is currently considering the risks posed to UK financial stability. And internationally the Financial Stability Board (FSB) will report to the G20 in Argentina later this month on the financial stability implications of crypto-assets. At present, in my view, crypto-assets do not appear to pose material risks to financial stability.

This is in part because they are small relative to the financial system. Even at their recent peak, their combined global market capitalisation was less than 1% of global GDP. In comparison, at the height of the dotcom mania, the valuations of technology stocks were closer to about a third of global GDP. And just prior to the global financial crisis, the notional value of credit derivative swaps was 100%. In addition, major UK financial institutions have minimal exposures to the crypto-asset ecosystem.

Looking ahead, financial stability risks could rise if retail participation significantly increased or linkages with the formal financial sector grew without material improvements in market integrity, anti-money laundering standards and cyber defences.

Authorities are rightly concerned that given their inefficiency and anonymity, one of the main reasons for their use is to shield illicit activities[23]. This cannot be condoned. Anarchy may reign on the dark web, but in the UK it's just a song that your parents used to listen to.

Moreover, structural vulnerabilities in cryptocurrencies mean that they are inherently risky compared with traditional financial assets. The risks include extreme price volatility and poor market liquidity due to fragmented markets and highly concentrated holdings, which in turn facilitate manipulation and misconduct. These vulnerabilities are compounded by operational and technological weaknesses, as evidenced by a series of major crypto-asset heists[24].

In addition, there is unease that the combination of these vulnerabilities and widening retail participation could damage the reputations of those financial intermediaries connected to crypto-asset markets. In extreme circumstances, it could even undermine confidence in the broader financial system itself, particularly if people held an unfounded belief that authorities had legitimised these activities.

To isolate, regulate or integrate?

Authorities need to decide whether to isolate, regulate or integrate crypto-assets and their associated activities. A few jurisdictions have banned crypto-assets outright[25]. And some regulators have sealed off crypto-assets from the core of the financial system in order to curtail risk of contagion. Most prominently, China—which had been one of the most active crypto-asset markets—recently banned exchanges, financial institutions and payment processors from handling them.

If widely adopted, however, isolation risks foregoing potentially major opportunities from the development of the underlying payments technologies.

A better path would be to regulate elements of the crypto-asset ecosystem to combat illicit activities, promote market integrity, and protect the safety and soundness of the financial system. The time has come to hold the crypto-asset ecosystem to the same standards as the rest of the financial system. Being part of the financial system brings enormous privileges, but with them great responsibilities.

In this spirit, the EU and the US are requiring crypto exchanges to meet the same anti-money laundering and counter the financing of terrorism standards as other financial institutions[26].

Conduct and market regulators are considering how to classify crypto-assets, in order to secure market integrity and determine the appropriate type and level of investor protections. In my view, holding crypto-asset exchanges to the same rigorous standards as those that trade securities would address a major underlap in the regulatory approach. And as the SEC and FCA have argued forcefully, so-called initial coin offerings will not be allowed to use semantics to avoid securities laws designed to protect retail investors in particular.

Prudential regulators, like the Bank's PRC, are in the process of clarifying how the existing regulatory requirements – including for capital – which institutions at the core of the financial system must meet, apply to any future crypto-asset activity undertaken and exposures acquired. Recently in the US, the regulated exchanges CME and CBOE have started to offer Bitcoin futures. Having derivatives traded and cleared on exchanges could, in time, raise standards in them and mean that regulators have better information about how the underlying markets function.

The discussions at the FSB and the G20 will be valuable given the diversity of possible approaches and the decentralised and cross-border nature of crypto-assets.

Pointing to the future

I trust you have gathered by now that for many reasons the crypto-assets in your digital wallets are unlikely to be the future of money. But that is not meant to dismiss them. Their core technology is already having an impact. Bringing crypto- assets into the regulatory tent could potentially catalyse innovations to serve the public better. Indeed, crypto-assets help point the way to the future of money in three respects:

- By suggesting how money and payments will need to adjust to meet societies' changing preferences, particularly for decentralised peer-to-peer interactions;
- Through the possibilities their underlying technologies offer to transform the efficiency, reliability and flexibility of payments; and
- By the questions they raise about whether central banks should provide a central bank digital currency (CBDC) accessible to all.

Let me take these in turn. First, crypto-assets are part of a broader reorganisation of the economy and society into a series of distributed peer-to-peer connections across powerful networks[27]. People are increasingly forming connections directly, instantaneously and openly, and this is revolutionising how they consume, work, and communicate.

Yet the financial system continues to be arranged around a series of hubs and spokes like banks and payments, clearing and settlement systems. Crypto-assets are an attempt to create the financial architecture for peer-to-peer transactions. Even if the current generation is not the answer, it is throwing down the gauntlet to the existing payment systems. These must now evolve to meet the demands of fully reliable, real-time, distributed transactions.

Second, the technologies underlying crypto-assets, particularly distributed ledger, can:

- Increase the efficiency of managing data;
- Improve resilience by eliminating central points of failure, as multiple parties will share replicated data and functionality;
- Enhance transparency (and auditability) through the creation of instant, permanent and immutable records of transactions; and
- Expand the use of straight-through processes, including with 'smart contracts' that on receipt of new information, automatically update and if appropriate, pay.

These properties mean distributed ledger technology could transform everything from how people manage of their interactions with public agencies, including their tax and medical records, through to how businesses manage their supply chains.

Third, crypto-assets raise the obvious question about whether their infrastructure could be combined with the trust inherent in existing fiat currencies to create a central bank digital currency (CBDC). Currently only banks can hold central bank money electronically in the form of a settlement account at the Bank of England. To be truly transformative a general purpose CBDC would open access to individuals and firms.

The Bank has an open mind about the eventual development of a CBDC and an active research programme dedicated to it. That said, given current technological shortcomings in distributed ledger technologies and the risks with offering central bank accounts for all, a true, widely available reliable CBDC does not appear to be a near-term prospect.

Moreover, whether it is desirable depends on the answers to a series of big policy questions. While these are largely for another day, I will note that a general purpose CBDC could mean a much greater role for central banks in the financial system. Central banks may find themselves disintermediating commercial banks in normal times and running the risk of destabilising flights to quality in times of stress[28].

There are also broader societal questions (that others would need to answer) such as how society balances privacy rights with the extent to which the information in a CBDC could be used to fight terrorism and economic crime. A CBDC shouldn't be a solution in search of a problem or an effort of central bankers to be down with the kids. Especially because there are more immediate ways to give you what you want.

The foundation of better payments

So while our research on a possible future CBDC will continue, we're more excited by the opportunities to transform digital payments now. In particular, the combination of the Bank's overhaul of RTGS and new technologies promises a world where payment systems can better meet societal demands for fully reliable, real-time, distributed peer-to-peer transactions.

RTGS is already pretty awesome, settling over £600 billion of payments in real time each day, while eliminating settlement risk and with an extremely high degree of resilience, all at a cost – to direct participants – of less than one ten millionth of the value of the average payment.

But RTGS are getting on and we are renewing it[29]. What could this rather technical sounding development mean? More than you might think.

Currently when you pay for your everyday expenses, you probably use a debit card, a credit card or digital wallet on your phone. These need to be routed through the card provider's network. Over the past four years, the payment-related costs that your retailer or service provider pay (and ultimately pass on to you) have come down by 40% to around 8 pence per transaction.

While these are small – and much better than Bitcoin – they remain non-negligible. That's partly because there is limited scope for them to be competed away by innovators offering lower costs, faster speeds and more convenience, due to rigidities in the existing payments landscape, including restricted access to the UK's major bank-to-bank payment system, Faster Payments (FPS). To put a number on it, indirect members of FPS face relatively high fees of around 37 pence per transaction[30].

In 2016, the Bank announced arrangements under which non-bank payment service providers (PSPs) could access RTGS, and therefore FPS directly, and we expect the first will join this spring. PSPs that make the most of this development and reach critical mass could see their per transaction costs fall below those of debit and credit card providers. And the competition provided by the PSPs should incentivise existing providers to innovate as well.

Moreover, innovative PSPs could deliver a world where you can split a round in the pub electronically and instantaneously, needing nothing more from your friends than a QR code on their phone or their phone number. By so doing, electronic money will become more like its physical relative, allowing genuine, immediate peer-to-peer transactions, without the need for a middleman.

Our overhaul of RTGS is helping to reduce complexity and costs in other areas as well.

Take cross-border payments, where the Bank is leading by the adoption of emerging global standards for payments messaging and by working with other central banks and the private sector to explore the scope for cross-border payments in central bank money through synchronised national RTGS systems. This all could increase the speed and safety, as well as lower the costs, associated with cross-border transactions to support purchases and travel overseas.

When coupled with the capture of richer payments data made possible by its renewal, RTGS will help support innovative services for the more effective management of personal and company finances. These benefits will be amplified by the UK's ambition in implementing the Open Banking standard– under which the largest banks will be required to make customer data available to other existing firms and innovators, if the customer demands. In turn, this will help improve aggregator, comparison and switching services.

Taken together, these advances will support innovation that allows you to manage your finances seamlessly, from tracking how much you spend, to managing your future savings and current loans.

Finally, at the wholesale payments end, we've already explored whether the core of the new RTGS system could run on distributed ledger to discover that the technology is not yet sufficiently mature or reliable to run a system that settles the equivalent of a third of the UK's annual GDP each day and requires 5-sigma performance.

Nonetheless, the Bank believes that distributed ledger technology could over time significantly improve the accuracy, efficiency and security of processes across payments, clearing and settlement.

Securities settlement in particular is ripe for innovation. Transactions that take nanoseconds to execute, currently take days to settle along a chain involving many intermediaries. At stake, are the tens of billions of pounds of capital that are tied up while settlement completes[31]. The best in the private sector are working hard unlocking this value. That's why the Bank is building the new RTGS so that new forms of securities settlement that meet our standards of resilience (including those using distributed ledger) will be able to plug in directly.

Ultimately this combination of new technology and direct access to RTGS could be applied to other assets such as helping make the payment, registration and Stamp Duty processes involved in house purchases quicker and more efficient.

The future of money

While Adam Smith was cautious about the role of the state, he recognised it should furnish the rules and conditions within which private innovation can flourish. In the monetary sphere, this means providing money which citizens can use with confidence and ease.

The Bank of England delivers just that through the quality of our banknotes, the stability of UK inflation, the resilience of our financial system, and efficiency and reliability of our core payment systems. We are overhauling our system, RTGS, so that private innovation can flourish. Bringing crypto-assets onto a level regulatory playing field could also catalyse private innovation to create a more resilient, effective payments system.

With these foundations in place, the scene is set for better payments and a better economy. ■

Mark Carney is Governor of the Bank of England

Endnotes

1. 'Stabilising an unstable economy' Hyman Minsky, 1986

2. This is the quote as abbreviated on the £20. The full quote is "this great increase in the quantity of work which, in consequence of the division of labour, the same number of people are capable of performing", Book 1, Chapter 1, Smith, A., (1776) 'An inquiry into the nature and causes of the wealth of nations'.

3. "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest". Book 1, Chapter 2, ibid.

4. For this reason, some economists consider the operation as a unit of account to be the most important characteristic of money. Indeed, it is commonly argued that a defining feature of monetary policy lies in central banks' control of the unit of account. See Ali, R, Barrdear, J, Clews, R and Southgate, J, (2014) 'The economics of digital currencies', Bank of England Quarterly Bulletin, 2014 Q3.

5. The last private bank to issue its own banknotes in England and Wales was Fox, Fowler and Company in 1921.

6. Seven banks in Scotland and Northern Ireland can issue banknotes. The Regulations specify that at least 60% of an authorised bank's notes in circulation must be backed by Bank of England notes and UK coin and that the remainder, plus all notes with the potential to enter circulation, must be backed either by such notes and coin or by funds placed on deposit in an interest-bearing account at the Bank of England.

7. The data are for 2016. To note, banknotes accounted for 45% of transactions in 2015, and as such there was a 5 percentage point fall year-on-year which may be related to increased use of cards and online payments.

8. See McLeay, M, Radia, A, and Thomas, R, (2014), Money Creation in the Modern Economy, Bank of England Quarterly Bulletin 2014 Q1, which notes that the reality of how money is created often differs from that found in standard textbooks, and rather than banks receiving deposits when households save and then lending them out, bank lending creates deposits.

9. Although it does not target monetary aggregates per se, the Bank of England conducts monetary policy to ensure the amount of money creation in the economy is consistent with low and stable inflation. In normal times, the Bank of Eng-

land implements monetary policy by setting the interest rate on central bank reserves. In exceptional times when interest rates cannot be lowered further, the Bank implements monetary policy by purchasing assets, which has the by-product of increasing the central bank reserve holdings of private banks.

10. Other institutions include legal tender status (meaning that you cannot be sued for non-payment of debts if you offer sterling to meet them) and the insurance of deposits of up to £85,000 at banks and building societies backed by the Government.

11. This will feature JMW Turner. For further information see https://www.bankofengland.co.uk/banknotes/polymer-20-pound-note

12. The Bank operates the Real-Time Gross Settlement (RTGS) service and infrastructure that holds accounts for banks, building societies and other institutions. The balances in these accounts can be used to move money in real time between these account holders. This delivers final and risk-free settlement.

13. Whereas banks hold records of most fiat money and are entrusted to ensure its validity, with digital currencies, the ledger containing all transactions by all users is publicly available. Rather than placing trust in central institutions – such as banks (and by extension the centralised authorities like the Bank of England that supervise them) – reliance is placed on the network and the rules to update the ledger reliably.

14. Satoshi Nakamoto (2008), 'Bitcoin: A Peer-to-Peer Electronic Cash System' bitcoin.org, October 2008.

15. For example, the supply of Bitcoin is limited to 21 million units by 2040. In the long run, a fixed money supply may harm the macroeconomy by contributing to deflation in the prices of goods and services, and in wages. And the inability of the money supply to vary in response to demand would likely cause greater volatility in prices and real activity.

16. As the Italian philosopher George Santayana famously observed.

17. Carstens, A, (2018), "Money in the Digital Age: What Role Central Banks?" See https://www.bis.org/speeches/sp180206.htm

18. Based on the British Retail Consortium's Payment Survey 2016, which surveys the costs that retailers incur for accepting payments, including bank charges, handling charges, infrastructure costs and write-offs (losses). Link to survey:

https://brc.org.uk/media/179489/payment-survey-2016_final.pdf

19. The reward for each new block halves every 210,000 blocks (approximately every 4 years) and currently stands at 12.5 bitcoin per block. This regular halving of the block reward results in an exponential slow-down in the growth rate of Bitcoin supply. It is estimated that by 2040 99.8% of total maximum Bitcoin supply will have been generated.

20. For Bitcoin energy usage, see: https://digiconomist.net/bitcoin-energy-consumption. For Scottish energy usage, see http://www.gov.scot/Topics/Statistics/Browse/Business/Energy/EIS2018

21. For Visa's energy usage, see their Corporate Social Responsibility Report (2016).

22. Innovations are reducing computational efforts to prove a transaction, such as Litecoin and Ethereum's proposed moves to "proof of stake" from "proof of work".

23. The proportion of crypto-assets used for illicit activity remains hard to quantify. One academic study suggests that about a quarter of Bitcoin users and one-half of all Bitcoin transactions are associated with illegal activity. Sean Foley, Jonathan R Karlsen, and Tālis J Putniņš (2018), 'Sex, Drugs, and Bitcoin: How Much Illegal Activity Is Financed Through Cryptocurrencies?' available at http://dx.doi.org/10.2139/ssrn.3102645.

24. In February 2014, MtGox, the largest Bitcoin exchange at the time, revealed that around 850,000 of customers' Bitcoins, then valued at around $450 million, were missing and had likely been stolen. In 2016, 120,000 units of Bitcoin valued at $72 million were stolen from Bitfinex's customer accounts. In January 2018, $530 million of cryptocurrency "XEM" was stolen from Japanese exchange CoinCheck. In all cases, funds were stolen from "hot wallets", where the private key is stored on a computer or device that is connected, directly or indirectly, to the internet.

25. Cryptocurrencies have been banned in Bangladesh, Bolivia, Ecuador and Morocco.

26. In the EU, the revision of the 4th AML Directive will bring exchanges and wallet providers in the scope of the anti-money laundering and combatting the financing of terrorism rules. In the US, virtual currency exchanges are regulated as money transmitters and required to abide by Bank Secrecy Act obligations.

27. See Fergusson, N, (2017), 'The Square and the Tower: Networks, Hierarchies and the Struggle for Global Power'.

28. See Broadbent, B, (2016), "Central Banks and Digital Currencies", a speech given at the LSE

https://www.bankofengland.co.uk/speech/2016/central-banks-and-digital-currencies
29. See "A Blueprint for a new RTGS service for the United Kingdom", May 2017.
30. PSR indirect access market review,
https://www.psr.org.uk/sites/default/files/media/PDF/MR1512-indirect-access-market-review- interim-report.pdf
31. Oliver Wyman and Santander estimated that distributed ledger technology could reduce banks' infrastructure costs attributable to cross-border payments, securities trading and regulatory compliance by $15-20bn per annum by 2022. See: https://santanderinnoventures.com/fintech2/

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Cryptocurrencies don't make sense

Cryptocurrencies are supposedly the way of the future. Jon Danielsson finds them no better than existing fiat money or good investments

Cryptocurrencies are supposedly a new and superior form of money and investments – the way of the future. The author of this column, however, does not see the point of cryptocurrencies, finding them no better than existing fiat money or good investments.

I have been trying to understand what the point of cryptocurrencies is, without success. They may not be an immediate financial stability concern (den Haan *et al*. 2017), but I just don't get them.

As far as I can tell, they are supposed to be some combination of:

- a type of money;
- an investment;
- something that provides privacy and security and efficiency;
- something else, new and magical and mystical that I am too stupid or old to understand.

Are cryptocurrencies money?

What do we need money for? Three things:

- facilitating transactions;
- a store of value;
- lending of last resort.

Any form of money should be evaluated according to those criteria. We have used many things throughout history as money, like seashells, cigarettes, silver and gold. These are all scarce real assets with value to their users, available in small units and easy to transact.

No country has such money anymore. Instead, what we use is fiat money, a currency without any intrinsic value. Paper printed by the government, whose quantity is amplified by the financial system. It is only valuable because the government guarantees it is.

Fiat money issued by a credible modern central bank is vastly superior to money based on real assets like gold, not least because the supply of fiat money can be adjusted to best serve the economy, rather than be dominated by the production of some natural resource. The volume of cryptocurrency cannot be adjusted in the same way.

Cryptocurrencies are more like a religion or a cult, not a rational economic phenomena

Of course, governments are tempted to abuse fiat money and print too much, as the first creator of fiat money did, the Chinese government in the 13th century. More recently, the stagflation of the 1970s is due to the central banks being bad stewards of money.

Because the governments of the time could not be trusted, several thinkers proposed free monetary systems, such as Hayek in 1977, discussion which presages current cryptocurrency debates. Still, advances in monetary policy eventually gave us more stable money by the 1980s.

So how do cryptocurrencies stack up on the criteria for money mentioned above: as a store of value, ease of transactions and for lending of last resort?

They are vastly inferior for transactions. Transactions with cash are costless, anonymous, and immediate. Electronic transactions are very cheap and also immediate, and can be done in any amount.

Bitcoin transactions take an hour or more, with a cost of at least $25, and they are not all that anonymous. Yes, there are cryptocurrencies that promise more efficiency or privacy. But even then, while it can take a long time to find someone who accepts Bitcoin, it is much longer with the competitors. Meanwhile, the largest amounts that can be transacted by cryptocurrencies are dwarfed by those one can transact with fiat money.

And what about store of value? Neither cryptocurrencies nor fiat money have any intrinsic value. What matters is credibility – our expectation that the money will retain its value over time.

For fiat money, the central banks are committed to keeping its value stable at a decreasing rate of 2% per year. The major central banks have been quite successful at keeping their tracking error small for a long time.

Bitcoin and other cryptocurrencies are much inferior in this regard. Their value doubles or halves in a span of few days. One cannot say with any degree of certainty that one's holdings of cryptocurrencies will hold their value over the next week, not to mention a month or year. If one holds cryptocurrencies, it is for speculative reasons, not as a store of value.

That leaves lending of last resort (LOLR), providing liquidity to financial institutions in times of crises. This has been an essential function of central banks ever since Walter Bagehot's 1873 analysis of the 1866 crisis. LOLR was last used in 2008, and will certainly be needed again at some point in the future. There is no such facility in any of the cryptocurrencies.

If cryptocurrencies are money, they are a much inferior to existing fiat money.

Are cryptocurrencies investment?

Cryptocurrencies, along with fiat money, have been called Ponzi schemes. Not quite. The definition of a Ponzi scheme is an investment where existing investors are paid for by new investments. Neither cryptocurrencies nor fiat money fit the definition.

But are the cryptocurrencies an investment? It depends on what one means by investment. The value of a stock or a bond reflects future income appropriately discounted to the present. Not so with cryptocurrencies or fiat money. They have no intrinsic value. Their value is caused by scarcity, as well as the cost of mining or government promises. However, mining is sunk cost, not a promise of future income.

The only reason cryptocurrencies retain value is because we expect other people in the future to value them the same, or more than we do now. Just like collecting stamps. The value of stamps is created by scarcity and expectations of future investors pricing them more highly than we do now.

Cryptocurrencies are not an investment in the same way as a stock or a bond. They are an investment in the same sense as stamp collections are.

However, even then, most people don't use fiat money directly as a store of value except in small amounts. At the very least, one can keep fiat money in a bank account or government bonds that earn interest. An investment that is as safe as the government. The possibility of such near riskless lending at stable rates is absent for cryptocurrencies.

So if cryptocurrencies are an investment, they are more like stamps or lottery tickets than fiat money, stocks, or bonds.

Credibility

The intrinsic value of fiat money is underpinned by the credibility of the government and the central banks tasked with controlling money.

Central banks are independent and with considerable political cover, essential to ensure the credibility of fiat money. Countries that disregard the latest developments in monetary policy, like Venezuela, do that to their cost.

Central bank independence, political cover, and reputation for competence are key. Jerome Powell, the current chair of the Federal Reserve system, is the most powerful bureaucrat in the world. General Joseph Dunford, Chairman of the Joint Chiefs of Staff, might have nuclear weapons in his arsenal, but he reports to President Trump. Jerome Powell does not.

While our faith in central banks has increased considerably since Friedrich Hayek wrote his article cited above, it could still be higher. However, I can download detailed performance statistics on fiat money dating back decades. I know the supply of money and I know the policy tools used and I can make up my own mind. Information about cryptocurrencies and other activity statistics is much harder to come by and have a much smaller history.

The value of the euro and of the dollar is underpinned by the credibility of the ECB or the Fed. With cryptocurrencies, it is the credibility of some unknown entities and processes.

I trust the central banks in developed economies much more than I trust any of the cryptocurrencies.

Privacy and security

That leaves privacy and security. Cash is 100% anonymous, but one is at some risk of theft. Electronic transactions are not anonymous, but are safer.

While some cryptocurrencies promise anonymity, the most popular, Bitcoin does not, unless one is really careful in hiding one's tracks using skills that are only available to a small group of users. The reason is that transaction records on the blockchain cannot be changed or deleted and are therefore searchable.

Meanwhile, not a day passes without reports of theft from cryptocurrency investors. The best advice is to keep one's private key on an air-gapped burner laptop.

Cash and electronic money are also subject to theft. Still, there is no need for a private key with cash transactions and keys are much less important for electronic cash transactions. There are multiple layers of security that protect us. The fiat money of non-expert users, provided they take basic precautions, is very safe.

I feel quite confident in doing online banking without resorting to an air-gapped burner laptop.

Cryptocurrencies are only safe from theft if one is expert and takes elaborate precautions. We are much more likely to be a victim of a crime with cryptocurrencies than cash or electronic money.

So...

Cryptocurrencies are inferior to most fiat money and investments, while they do not provide privacy or security.

When I say this to advocates of cryptocurrencies they usually respond in two ways – that I don't understand cryptocurrencies, and that they have new and wonderful qualities that I miss.

There are many things I don't get, but I have put some effort into understanding the mechanics of cryptocurrencies. However, one can know all the mechanics, all the geeky technical details, and still not have a clue about what they mean.

Take as an example human beings. I can know all the physics and chemistry and physiology, understand how molecules and organs operate, yet still don't know the first thing about an individual.

It's the same with cryptocurrencies. Knowing the mechanical details does not translate to understanding their economic function.

Cryptocurrencies are more like a religion or a cult, not a rational economic phenomena. They even have their own foundation myth, the elusive Satoshi Nakamoto.

I await my enlightenment. ■

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Regulation within cryptocurrency markets

Alex Larsen examines the different ways to regulate cryptocurrencies to ensure both protection and innovation

According to Reuters: *"Japan's financial regulator said on Friday it had ordered all cyrptocurrency exchanges to submit a report on their system risk management, following the hacking of over half a billion dollars of digital money from Coincheck."*

Whilst the whole premise of blockchain technology and cryptocurrencies revolves around it being essentially unhackable, the exchanges that trade these currencies are vulnerable. The introduction of system risk management (which we assume to be risk management of the software/operating systems and servers) checks is a step forward for the cryptocurrency space although it only covers one area of exposure linked to the cryptocurrency market.

History of incidents

Crypto currency has been a booming market with increases in some major coins in the high 1000's of percent over the last year. This rise, coupled with a lack of regulation, has seen the cryptocurrency world being hit with a number of negative incidents from Ponzi schemes to fraud, scams and hacking incidents.

Bitconnect, which as of writing of this article, is trading at roughly $8.60, a huge fall from its height of over $300 a month ago, is an example of a potential major Ponzi scheme which has lost $2.4 billion worth of value over 10 days.

The subpoena by US regulators of crypto exchange Bitfinex and its relationship with Tether is another concern to the crypto currency market with many claiming Tether to be a scam. Tethers are tokens backed by US dollar deposits, with each tether always worth one dollar. These tokens should be backed by dollars but thus far the company has yet to provide evidence of its holdings to the public and has not had any successful audits as of yet.

There have also been a large number of Initial Coin Offerings (ICO's), used to raise money for startups by issuing tokens/coins, which have raised vast sums of money only for the owners to disappear with all the money, whilst others have been less deliberate but have been just as devastating to investors. A cryptocurrency called Tezos, raised $232 million last year, but suffered internal power struggles which has left the project in disarray.

This brings us to the current concern in Japan of cyber attacks of exchange platforms. Cyber attacks and hacking attempts of exchanges have been frequent with Bitfinex, coinbase and kraken amongst others having been closed down for days at a time during 2017 due to a number of hacking attempts. It is the successful hacking incidents which are the most worrying however, with successful hacks such as MT Gox, which cost almost 350 million and two

Whilst the whole premise of blockchain technology and cryptocurrencies revolves around it being essentially unhackable, the exchanges that trade these currencies are vulnerable attacks on Youbit which led to its bankruptcy. The most recent coincheck hacking was worth 500 million, a record, and it is this which has caused Japan to act.

Regulation

Last year, China took a definitive stand on regulation on crypto currencies which sent shockwaves through the market. Some feel it was perhaps heavy handed with ICO's being banned, bank accounts being frozen, bitcoin miners being kicked out and nationwide banning on the internet of cryptocurrency trading related sites. Others however believe that it has been a positive step, and has encouraged other governments to take regulation seriously and hopefully take a more balanced approach. It certainly isn't in the interest of governments to stop ICO's, which provide many positives including innovation, but they should certainly regulate them from a consumer protection, taxation and organised crime standpoint.

Implementing regulation also removes uncertainty for investors as well as the companies who are involved in ICO's. Uncertainty is the source of many risks and often a negative certainty is better than uncertainty as it allows a focus within set parameters.

It's important to remember that too little regulation doesn't offer protection and too much stifles innovation.

How to regulate

There are a number of ways to regulate cryptocurrencies and the following are just some examples:

- Framework for ICOs

New ICO's are currently not subject to much in terms of regulation globally. One of the problems is determining how they should be treated with some being considered securities. As a fund raising vehicle, there could certainly be a framework that lays out key requirements of an ICO such as a company needing to be registered in order to issue a token, transparency in terms of individual members of the registered company as well as perhaps introducing a few requirements that regular IPO's require such as implementing risk management. Currently in USA, ICOs are expected to adhere to Anti Money Laundering (AML)/Know Your Customer (KYC) practices.

- Regulate exchanges

Exchanges, which is where much of the transactions take place in terms of trading coins, is a logical area of focus when it comes to regulations. South Korea's financial services commission for example, has stated that trading of cryptocurrencies can only occur from real-name bank accounts. This ensures KYC and AML compliance. According to the FSC, the measures outlined were intended to *"reduce room for cryptocurrency transactions to be exploited for illegal activities, such as crimes, money laundering and tax evasion."*

Regulators should focus on regulation that encourages transparency and minimises anonymity.

- Tax laws

Clarity needs to be brought into the tax laws in terms of when investors should pay capital gains. The USA has been quite quick to ensure that crypto-to-crypto transactions are now taxable and not just crypto to Fiat currency transactions. This is not the case in the UK however, where things are less clear and will become even more so, once cryptocurrencies start to introduce dividend like behaviour.

- Reserve requirements of exchanges

Most banks and stock exchanges are required to hold a certain amount in reserves in order to survive any major downturn or crash. This should most certainly be the case for cryptocurrency exchanges too especially considering the volatility which sees crashes of 60% several times a year with some crypto currencies falling 90% before recovering. This is also known in part as systemic risk which could be what the Japanese financial regulator defines as system risk.

- System risk management

As we have seen from this Japan story, one way of ensuring more protection and reliability is by ensuring there is regulation around system risk management on exchanges. There should be minimum requirements protecting against hacking, phishing and other cyber related attacks. The requirements could be scaled against value of the exchange, number of users or number of daily transactions.

It's important to note that much is being done to reduce the risks of hacking incidents such as the concept of a decentralised exchange. This would essentially be a cryptocurrency exchange on the blockchain, much like the cryptocurrencies themselves. This would reduce hacking significantly and whilst it is not currently practical, it could be the standard of the future.

Self-regulation

The cryptocurrency market gets a lot of negative publicity and much of this could be rectified if there was more self-regulation. It would also reduce volatility within the market and bring about positive change. This refers to both exchanges and ICO's alike.

The Japan Blockchain Association (JBA) for example has established self-regulation standards which includes the use of cold wallets amongst its 15 cryptoexchange members (of which Coincheck was one of them) and are now looking to strengthen the standards further following this recent incident.

Risk management in the cryptocurrency space

Risk management, as with all organisations, plays a vital role in meeting and exceeding objectives whilst providing resilience and stakeholder confidence. Exchanges and companies that are raising/have raised ICO's should ensure that risk management is part of their business. Identifying risks and opportunities, assessing them and implementing response plans should be standard. Cyber risks, reputational risks, operational risks, system risks and strategic risks should all be considered and prepared for, which would minimise market disruption and reduce the likelihood of financial ruin. At the very least they owe it to the investors who have funded them.

For investors, with volatility so high, the rewards are great but so are the risks. Investors should ensure that they only invest what they can afford to lose, do their due diligence on their investments which includes understanding the technology, the team and look for a prototype rather than a wild concept. Additionally, investors should always be on the lookout for phishing scams and suspicious emails.

Finally, even the most optimistic investor should at least consider that cryptocurrencies are a speculative bubble that could burst. ■

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Global repercussions of MiFID II

Jan Hanika and Tim Sundberg look at MiFID II, how the European financial services ecosystem will be redefined, and argue that companies will need a clear and proactive strategy to deal with the challenges ahead

The landscape in which financial institutions are operating is changing significantly. Technology-led transformation and cross-sector regulations are the leading drivers of that change, bringing major strategic challenges to the industry. Firms that cannot adapt to this digitalised and regulated world will face shrinking margins as a result of growing costs and decreasing relative revenue pools.

MiFID II, which came into force this January, will pose a significant challenge. The regulation promotes market integrity, increased transparency and investor protection, and will redefine the European financial services ecosystem. If it follows the same pattern as MiFID I, which brought changes in transparency and market structure to the equities market, then MiFID II will have a similar effect on OTC products and radically change the conditions for the funds markets.

It is now ten years since MiFID I came into force, and in that time equity trading has moved from a closed community and traditional exchanges to more accessible trading on regulated exchanges and multilateral trading facilities (MTFs). At the same time, we are seeing a more fragmented market and lower revenues due to increased competition and globalisation. One example of those changes can be seen in the Nasdaq statistics for the Stockholm Stock Exchange, comparing figures pre- and post-MiFID I. Recent figures show that almost 50% of trading volume today is made off the regulated market, and international participants now represent two thirds of the turnover in the Nasdaq market.

MiFID II covers a much broader scope of financial instruments than MiFID I, and may bring significant changes to the OTC market structure and the value chain of fund markets, leading to margin pressure for these products.

In the same way that MiFID I caused changes in equity trading, MiFID II, in combination with a higher level of digitalisation, will alter the trading landscape for fixed income products and derivatives. One possible scenario is a shift from OTC trading to accessible market places, and market structure moving to the same fragmented model as we have seen in equities, where firms will choose to transact on MTFs, OTFs and SIs. The best execution rules will most likely lead to the introduction of sales trader functions. These must verify prices from several sources and route the instructions for execution in the most beneficial way, similar to an equity smart order router.

Other impacts from MiFID II will come from market transparency requirements to publish quotes and disclose costs and charges. This will increase the cost awareness for clients and reduce the industry revenue pool.

We are entering a brave new world and companies need a clear and proactive strategy to deal with the changes ahead

The increased standardisation and harmonisation will drive accessibility and support further globalisation, leading to a shift in trading to market places rather than over the counter (OTC) trading. We are already seeing the impact of digitalisation and the demand for low cost global execution from clients on equity markets, and the same can be expected in the near future from institutional clients with investments in fixed income and derivatives. These drivers will also open up the local markets to international competition.

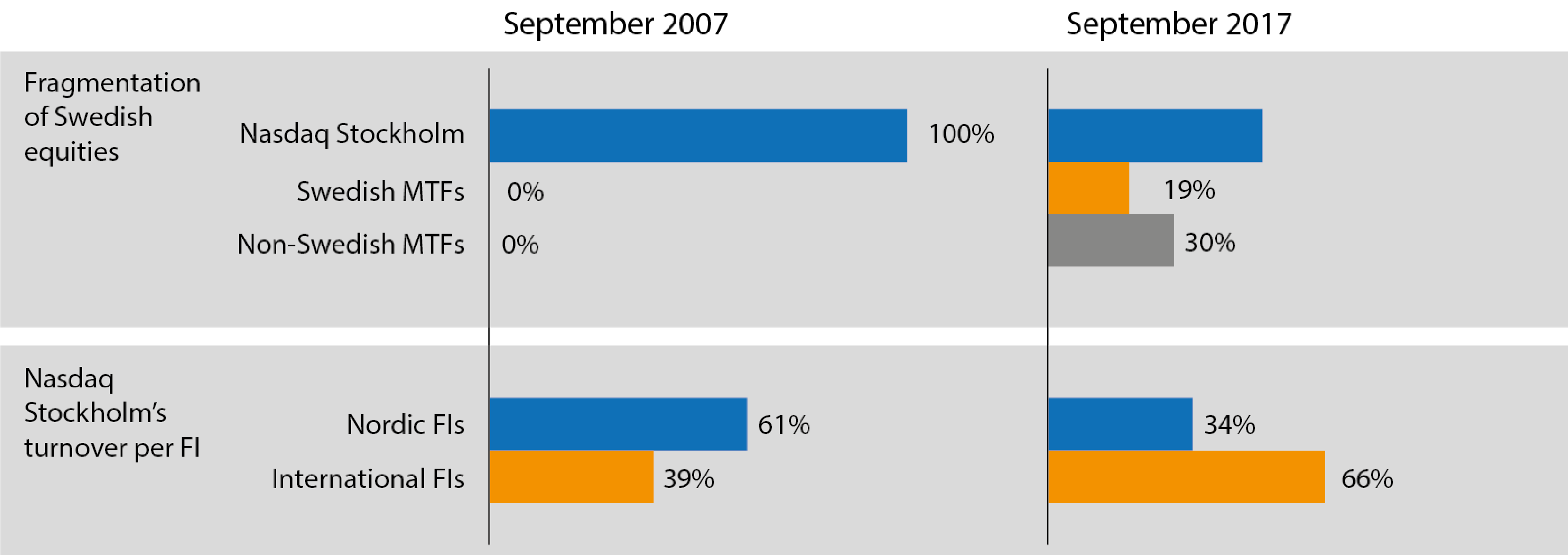
It is clear that MiFID II will create new pressures on margins and affect the whole value chain in the funds markets. The transparency rules will increase cost awareness among clients, which will have a negative effect on revenue pools for fund managers. At the same time, digitalisation will enable capital to move from actively-managed to passively-managed funds, which will also reduce revenues further. The decoupling of charges for research, which must be accounted for separately, will have consequences for pricing models for sell side and execution fees.

All this adds up to a world where firms will have to deal with revenue pressure, the increased threat of new entrants, buyers with more bargaining power and higher technology costs due to the need to meet multiple regulatory requirements and provide a bigger range of tactical solutions.

In response, players who want to retain their margins must become more effective, and that may mean making painful decisions about the future scale and scope of their company's operations. To do this well requires a detailed analysis, an extensive re-design of the business and a clear understanding of the strategic decisions needed.

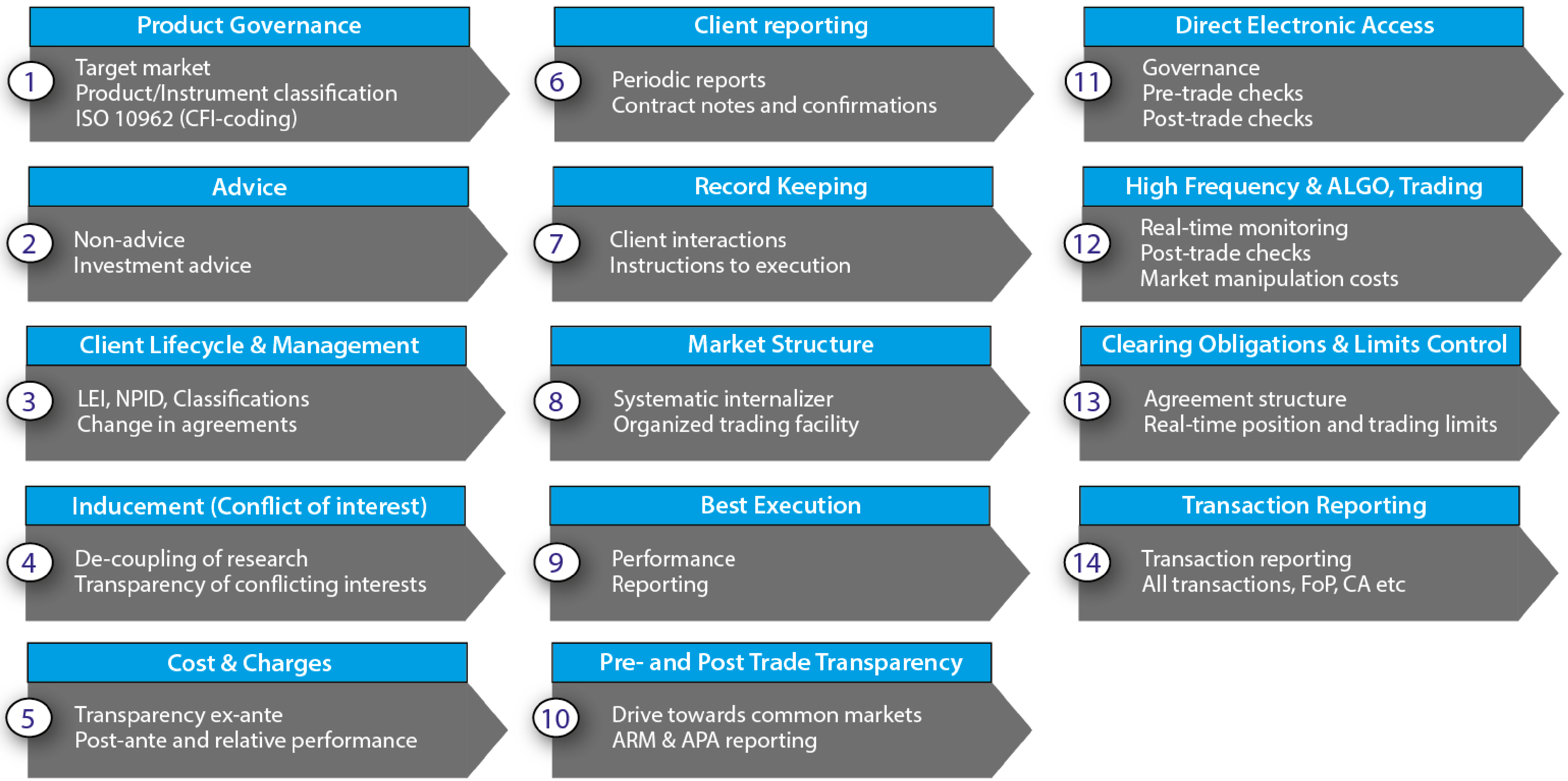
Firms should also look for new opportunities. For large companies, those opportunities will come from expanding into new markets and competing on large volumes and lower cost with smaller local players. They will be able to draw on their global experience and operational excellence across delivery channels and efficient management of

The ten-year internationalization and fragmentation of the Swedish/Nordic equity market



Source: Nasdaq statistics, Fidessa Fragmentation Index, PA Consulting Group analysis

MiFID2MiFIR requirement areas



Source: PA Consulting Group analysis

resources. Equally, companies that are already using technology to reduce cost and achieve efficiency will have a competitive advantage.

Therefore, local players will need to prepare for the arrival of new entrants. Even profitable medium-sized players should be exploring the impact of increased competition as their traditional approach of offering a full range of services will make them vulnerable in this new world. They will have to take a hard look at where they are truly competitive, where they offer high quality service and, more crucially, where they can differentiate themselves from their competitors. Where they can't do this, they will have to divest or outsource non-profitable businesses.

This requires action now. Sitting back, resting on the laurels and just hoping to react to developments as they happen is a recipe for failure. We are entering a brave new world and companies need a clear and proactive strategy to deal with the changes ahead. Further iteration is surely around the corner. Those companies that took short cuts on MiFID I had greater challenges implementing MiFID II. After a short respite, we should all be ready for taking on the challenges of MiFID III. ■

To read more insights about MiFID II from PA Consulting Group, please click here

Jan Hanika and Tim Sundberg are financial services experts at PA Consulting Group

Glossary

MiFID

Markets in Financial Instruments Directive is the European initiative to promote competition and enhance choice for investors across Europe. Mifid looks at so-called 'passporting' for financial products so that they can be traded across borders. It considers transparency and best execution. MiFIR Markets in Financial Instruments Regulation

FI

Financial institution, an organization such as a bank where people, companies, or governments put their money, which it invests to produce a profit.

OTC

Over-the-counter (OTC) is a security traded in some context other than on a formal exchange. The phrase 'over-the-counter' can be used to refer to stocks that trade via a dealer network as opposed to on a centralized exchange. It also refers to debt securities and other financial instruments, such as derivatives, which are traded through a dealer network.

MTF

A multilateral trading facility (MTF) is a European term for a trading system that facilitates the exchange of financial instruments between multiple parties. Multilateral trading facilities allow eligible contract participants to gather and transfer a variety of securities, especially instruments that may not have an official market. These facilities are often electronic systems controlled by approved market operators or larger investment banks. Traders will usually submit orders electronically, where a matching software engine is used to pair buyers with sellers.

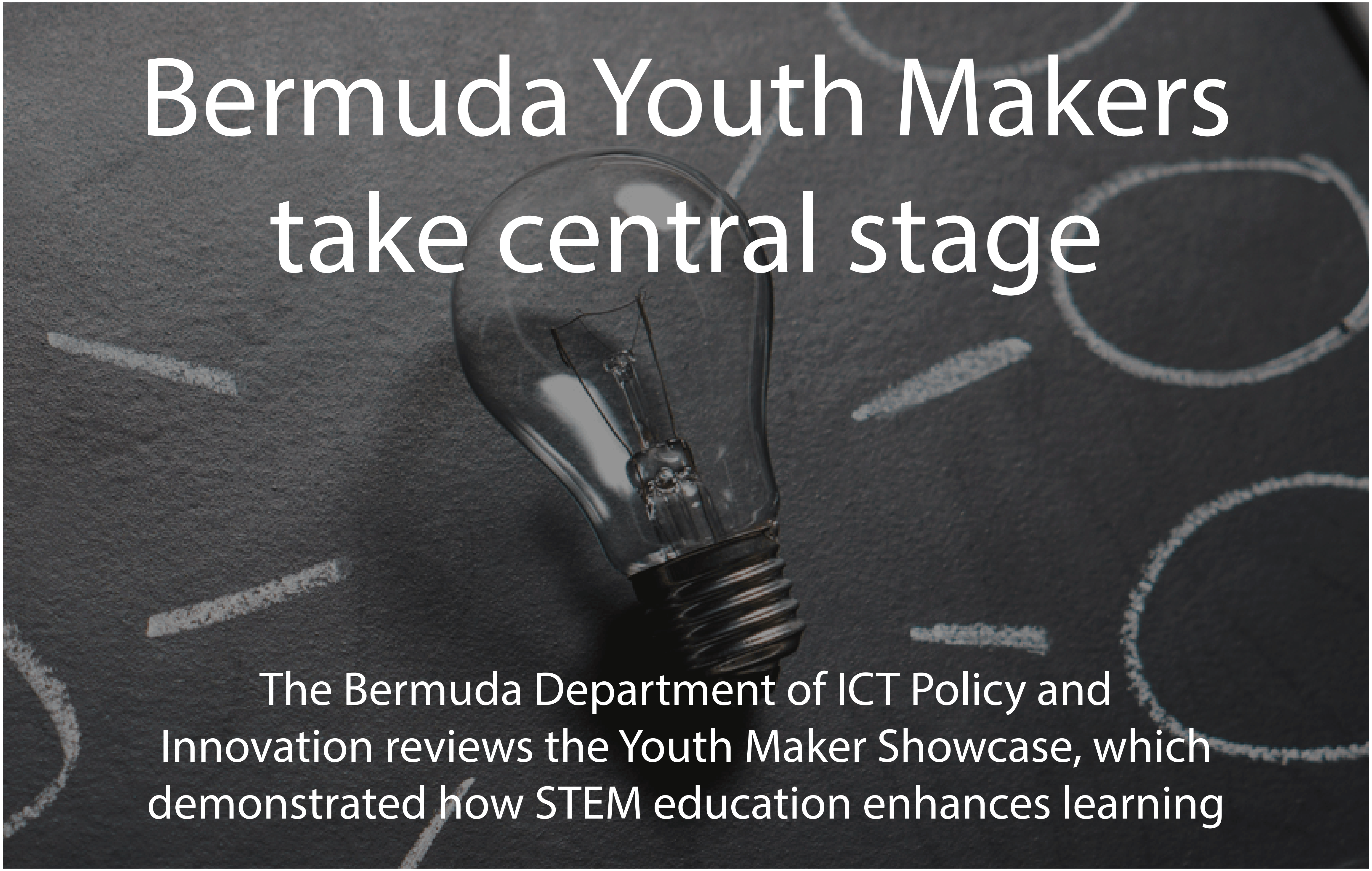
OTF

MiFID II introduces a new category of trading venue called Organised Trading Facilities (OTF). Within an OTF, multiple third-party buying and selling interests in bonds, structured finance products, emission allowances or derivatives are able to interact in a way that results in a contract. Equities are not permitted to be traded through an OTF.

SI

Systematic internalisers (SIs), traditionally called market makers, are investment firms who could match 'buy' and 'sell' orders from clients in-house, provided that they conform to certain criteria. Instead of sending orders to a central exchange such as the London Stock Exchange, banks can match them with other orders on its own book.

Source: FCA and Financial Times Lexicon



Bermuda Youth Makers take central stage

The Bermuda Department of ICT Policy and Innovation reviews the Youth Maker Showcase, which demonstrated how STEM education enhances learning

On Saturday January 20th innovation was celebrated in many ways as close to 200 youngsters and interested parents got a fantastic view of the scores of programmes that encourage Bermuda's young people to embrace innovation and harness their imagination and creativity. It all happened during the Youth Maker Showcase which was held at the gymnasium at Cedarbridge Academy in conjunction with the first-ever Parent Expo.

As the Island is increasingly integrating STEM education in its school curriculum at all levels, this was an opportunity to see what Bermuda's makers had been up to.

Who is a Bermuda Youth Maker?

Makers are people who create, build, design, tinker, modify, hack, invent, or simply make something. Through their work building and inventing, they make things that have the power to change the world. A 2005 quote from Steve Jobs at the Stanford Commencement embodies the spirit of the Maker Movement:

"Your time is limited, so don't waste it living someone else's life. Don't be trapped by dogma — which is living with the results of other people's thinking. Don't let the noise of others' opinions drown out your own inner voice. And most important, have the courage to follow your heart and intuition. They somehow already know what you truly want to become. Everything else is secondary."

Bermuda's Youth Maker movement is an overarching, informal group that includes independent inventors, designers and tinkerers and includes anyone on the Island who makes things: technology enthusiasts, crafters, educators, tinkerers, engineers, science clubs, authors, and artists. Bermuda's Youth Makers combine self-reliance with open-source learning, contemporary design and personal technology.

The Bermuda Youth Maker Movement therefore pulls makers together, from computer hackers to traditional artisans, whether they work with cardboard or with robotics, so that they can have the time and space to share ideas, learn from each other, and applaud each other's creative product development.

The 2018 Youth Maker Showcase

The 25 schools and community organizations which turned out to demonstrate their hands-on activities at this gathering of Maker programmes included the Department of Education's STEAM Academy, the FIRST Global Robot-

> *What one saw in the room was the latest in innovative tools and education coming together to offer alternative methods for learning not only to benefit Bermuda, but to benefit mankind*
>
> *The Hon. Wayne Caines, Minister of National Security*

ics Team Bermuda, CONNECTECH, the Bermuda Institute of Ocean Sciences, the Saltus Computer Science Department, and the Bermuda High School's Do-It-Yourself Club.

Together, they formed an impressive mix of the work of schools, government entities and community organizations whose only aim that day was to provide parents and students with an opportunity to be introduced to the latest in Do-It-Yourself learning opportunities that expose the youth to creative learning while building character.

Said The Hon. Wayne Caines, JP, MP, Minister of National Security: *"What one saw in the room was the latest in innovative tools and education coming together to offer alternative methods for learning not only to benefit Bermuda, but to benefit mankind. It is always gratifying to see when we as a country get things right. These activities are something that every person in this country can be proud of."*

Next step: the Youth Maker Faire

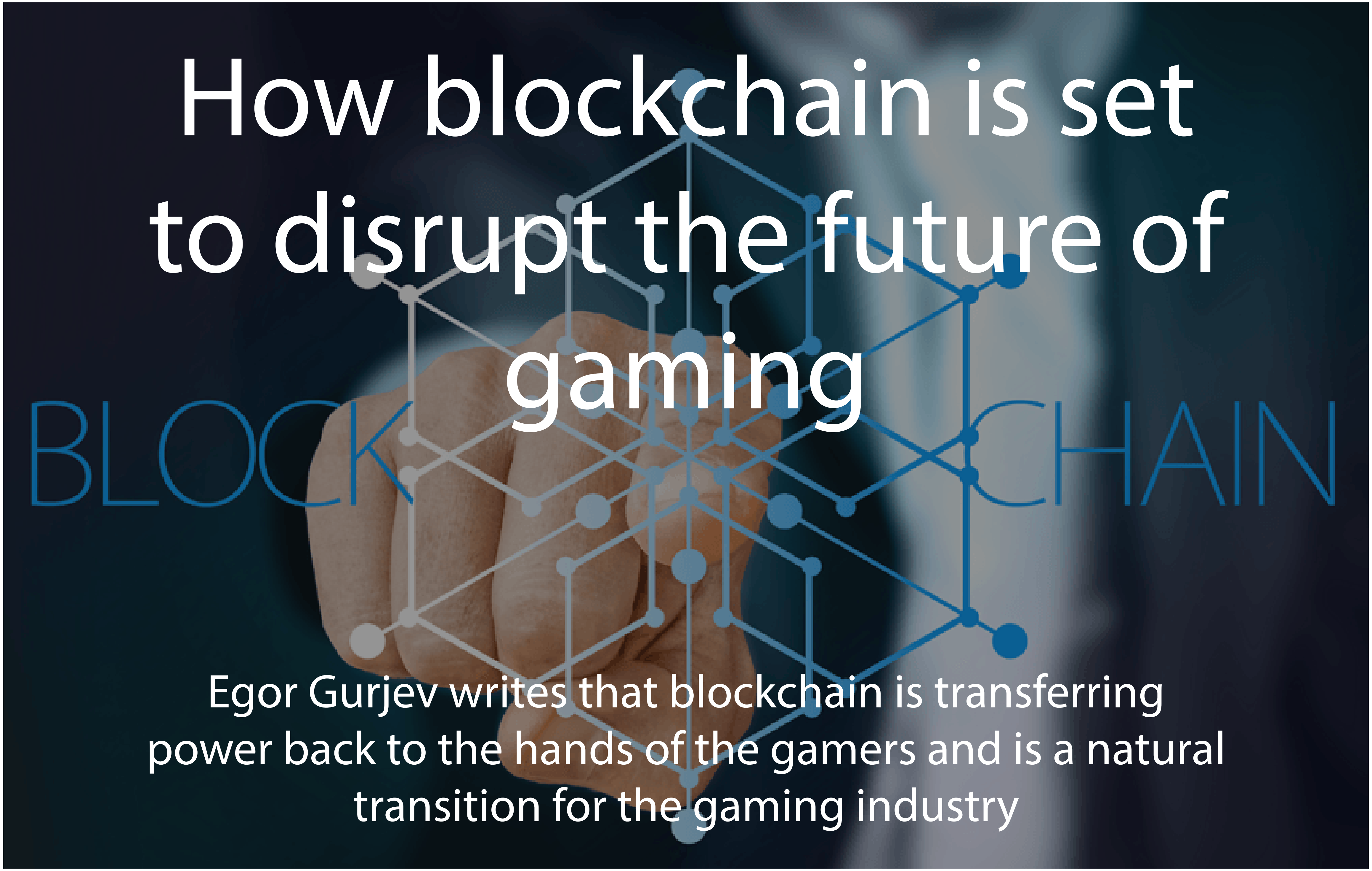
The Department of ICT Policy and Innovation within the Ministry of National Security and the Youth Entrepreneurship Initiative organized the Youth Maker Showcase. They both wish to continue the momentum created by the event by offering an official Maker Faire later in the year – and to demonstrate the many ways that STEM education can enhance learning at all levels.

The Maker Faire would showcase the Island's youth makers and aim to attract parents looking for the latest learning opportunities for their children. It would also encourage the youth to be introduced to and participate in the various Maker activities available to them. Who knows where that may lead… ■

Department of ICT Policy and Innovation, Ministry of National Security, Government of Bermuda

How blockchain is set to disrupt the future of gaming

Egor Gurjev writes that blockchain is transferring power back to the hands of the gamers and is a natural transition for the gaming industry



Developments within the gaming industry are not uncommon and blockchain technology is now the next, or for some the latest, wave of disruption to the industry. The key shifting factor for gaming is taking it from a traditional hardware platform and on to the cloud, via a decentralized gaming ecosystem. Blockchain technology naturally lends itself to achieving this.

Millions of gamers across the world are missing out on playing some of the biggest titles in the industry, due simply to lacking the powerful hardware required to run the games sufficiently. It is for precisely that reason that the gaming industry is required to move to the cloud where processing power can be shared, a step that will no doubt transform the industry as we know it.

Blockchain technology helps in this shift by encouraging owners of powerful gaming PCs and GPUs, to 'rent' their servers to the individuals who don't necessarily have the funds, or hardware they require, to play the games they desire. This means gamers will not have to invest in expensive gaming consoles and other hardware. The more developers look into blockchain technology, the more it becomes obvious that it is a natural transition for the industry.

Cloud gaming is not a new concept, but many have encountered fundamental problems in the past, namely internet quality and service difficulties. If the first problem was improving over the years, the second was causing some serious difficulties that stopped the development of this technology for a while.

Decentralisation is the answer. It is imperative to a speedy scaling process and will put the power back into the hands of the gamers and out of the hands of the corporations currently ruling the system. With no central body, consumers can communicate and socialize directly without intermediaries. This will allow for the freedom and flexibility that will benefit the gaming experience.

In fact, a re-occurring theme in the use of blockchain in the gaming industry is the end goal of transferring power back in to the hands of the gamers. One such example is the way some innovators are applying blockchain to the sale of gamer-earned digital goods, where gamers earn a reward or item as a result of the time and effort they invested in the game – and then sell it on for monetary reward. However, these kinds of transactions can often end in a scam, and those who are regulating the process, for example Steam, can only offer Steam credit in return for sale, rather than money.

Blockchain is set to transform this process. There are a number of companies now developing decentralized marketplaces for the sale of in-game items. These are safe spaces for such transitions, as a result of blockchain.

... blockchain is ready and waiting to completely transform the gaming industry, creating a more transparent and effective industry

A key benefit of blockchain technology is the transparency it provides, decentralized gaming is set to depend on the exchange and investment of cryptocurrency, for example the Playkey Token, and blockchain allows for all users to be able to exchange and trade worry-free. As a rule, cryptotransactions are easy-to-monitor even if they are not yours. For example one user is perfectly able to view the contents of a cryptowallet by only possessing the wallet address if the transaction was done under the smart-contract of the decentralized cryptoexchange like EtherDelta, for example. Another smart contract that is required to manage the rules of interaction between a miner and a gamer in a future Playkey decentralized ecosystem is also a transparent mechanism to guarantee a miner will get it reward once certain conditions within renting out its PC are met.

Online gaming security can also benefit greatly from the technology. Hacking is a common and frequent occurrence, this is due, amongst other things, to the use of centralized networks, meaning that hackers have an easy entry to the entire system via a single point of failure. Blockchain networks can not be hacked in a similar way due to their decentralization, meaning there are any number of servers active at any given moment.

A potential way for blockchain and cryptocurrency technology to integrate further into the industry is by offering crypto as an incentive to reward in-game achievements. Blockchain would make such payments a relatively simple process. Thus creating a genuine and achievable means of hardcore gamers being able to make a living out of their expertise.

Competitive gaming, AKA e-sports, could also benefit from the embracing of blockchain. The inner workings of a game and its servers, known as Core Logic, is handled by centralized servers unquestionably, with no real evidence to prove the fact that everything is working as advertised, and that the outcomes are genuine and un-tampered. Once upon a time, this was an un-solvable conundrum. However, blockchain has the potential to host a public core logic, providing absolute transparency. If this proved too costly or complicated, a similar outcome could be generated by proof of results being published to a public blockchain, which would allow analysists to re-run a game should the result be in question.

It is also worth saying that there will be a much heavier impact than we are even able to comprehend or foresee at this point, we've yet to unleash the full capabilities of blockchain technology. It is not simply the addition of cryptocurrency and the removal of intermediaries. It is the introduction of an auditable, verified store of data including players moves within a game, collating every possible measurement of data it can, all in a protected but open ledger.

Whilst some solutions are closer to completion that others, blockchain is ready and waiting to completely transform the gaming industry, creating a more transparent and effective industry. Gamers are such a passionate group of people, who feel strongly about the industry – a decentralized setup incorporating the many benefits of blockchain will hand the power back into the hands of gamers themselves, creating a democratized platform for all. ■

Egor Gurjev is CEO at Playkey


Time for a digital detox?
You Tube
Peter Thomson points out that our stressful work patterns are not caused by technology but by leaders who have allowed their organisations to develop unhealthy work patterns and are ignoring culture instead of managing it

We are living in an era of unprecedented change and transformation. Digitalisation presents businesses with unparalleled opportunities for value creation. New products and services can be offered and commercialised, systems and processes can be optimised, work processes can be automated and digital business models can be developed.

In the world of work, digitalisation has opened up many new avenues for organisations and their employees such as communication and collaboration between employees around the world, improved recruiting, talent management processes and workplace flexibility that allows organisations to adjust to their employees' personal situations, and better performance management.

We are swamped with data

But despite all these indisputable and flexible advantages, digitalisation also brings with it a variety of problems for organisations and individuals.

On an individual level, we are confronted with information overload and constant distraction from our core activities. Our consumption of material on the internet is at an incredibly high level, with a mind-numbing 2.5 million Google search queries, 2.8 million YouTube video views, 21 million WhatsApp messages and 700,000 Facebook logins happening *every minute*.

Employees are being swamped by a 'firehose' of information and are having to work longer and longer hours to keep up with it. Instead of technology bringing us a life of leisure, people are forced to be 'always on' and stress levels are soaring. This contradiction was the inspiration for us to research the cause of digital overload and propose a solution in our book *Conquering Digital Overload*[1].

Why are we all so stressed out?

Stress has been described as the 'health epidemic of the 21st century' by the World Health Organisation and its effect on our emotional and physical health can be devastating.

In a recent US study, over 50% of individuals felt that stress negatively impacted their work productivity.

According to a survey by the Chartered Institute of Personnel and Development in the UK, 38% of employees are under excessive pressure at least once a week and almost a third say they come home exhausted either often or

The real world is run by people as well as systems; people who have opinions, feelings, emotions and their own individual needs. Too often individual needs are compromised by corporate needs always. Increased levels of job stress have been demonstrated to be associated with increased rates of heart attack, hypertension, obesity, addiction, anxiety, depression and other disorders.

Digital technology was supposed to improve the way we work and increase productivity. But what has actually happened?

1

Our consumption of material on the internet is at an incredibly high level. Happening every minute there are...

2.5m

2.5 million Google search queries...

2.8m

2.8 million YouTube video views....

21m

21 million WhatsApp messages...

700k

700,000 Facebook logins

Overall employee engagement levels are no higher than they were 10 years ago. US productivity since the launch of the iPhone has slowed, so the new tools and technologies we have at work are not making us more productive.

A Deloitte report showed that 65% of executives rated the 'overwhelmed employee' as an 'urgent' or 'important' trend, while 44% said that they are 'not ready' to deal with it. Something strange is going on.

Have we learned nothing?

Surely by now we have realised that overlong working hours are detrimental to our health and the wellbeing of the businesses we work for.

There is probably over a century of research that confirms that it is bad for our health and bad for the organisations who demand it of us. And, to compound our health concerns, if we think that extending the working day by working while at home as opposed to the office might be better for us, a recent scientific study reported in the UK *Sunday Times*, showed that *"dealing with work issues while at home is pernicious to health and directly linkable to cardiovascular disease".*

For those who think this will all be solved when the rapidly ageing 'baby boomers' finally quit the workforce and leave it to the 'Millennials', think again. A report by the American Psychological Association in 2015 found that Millennials had the highest stress levels of all the generations. The problems of stress and depression are not going away anytime soon!

Don't blame the technology

Where is all this stress coming from? Can we blame the technology and tell people to switch it off? Some organisations have tried this, with limited success, but this is just putting a sticking- plaster over the problem. The solution lies deeper within the business and it is something that has to be addressed at senior management levels.

We have created organisational cultures that encourage stressful work patterns. Someone seen to be working extended hours is described as 'dedicated' and 'loyal'. The 'hard-working' employee is praised.

Consequently, we have cultures that subtly reward long hours. Replying to emails within a few hours, regardless of the time of day, is seen to be good behaviour. Staying in touch over the weekend or on vacation is good for promotion.

Rethink how work is done

To counter this, leaders have to recognise that work is performed for a purpose. They should agree on goals with their people and measure them against results. They need to reward output and outcomes, not input.

This creates a high-performance culture. It shows that people who meet their goals in the quickest time are the most productive and as a result are rewarded for short hours not long ones. The best employees become the ones that leave early and have a balanced life. Ones that have to work long hours are considered to be failing.

One example in our book is the Belgian Ministry (FPS) for Social Security. It has implemented an innovative new working model. Each employee has full autonomy over when, how and where he or she works. They have a work package assigned with a clear number of cases to be solved, a quality target (maximum number of mistakes) and a customer satisfaction target.

The organisation does not care about working time, which means employees decide how fast or slow they would prefer to work. The results after three years' experience show an incredible number, 95% of employees, like this new freedom better than the old system with fixed working times. On top of that, customer satisfaction went up 60% and output by 30%. A striking argument for this kind of increased flexibility.

Redesign outdated working practices

We need to rethink the design of work so it is not deliberately contributing to poor health. This is no longer an issue for the HR department alone, it is a matter of leadership strategy. If the culture of an organisation is to value the wellbeing of its workforce, it has to be backed up with policies and examples from the highest level.

Just offering subsidised gym membership and healthy food options in the staff restaurant is not enough. Providing training on wellbeing is not very helpful if the leaders are clearly not following their own guidance. Offering employee counselling services for stressed staff is attempting to control the symptoms and avoiding the cause.

We have ended up with outdated structures by building organisations out of jobs, laid out in an organisation chart to show reporting lines and levels of hierarchy. But real organisations are based on work, not jobs, people, not positions, and collaboration, not reporting. Leaders must understand how cross-functional collaboration produces results, how informal teams develop and flourish, and how networks of people are forming and evolving all the time.

It is too easy for leaders to focus on the tangible factors and ignore the intangibles. Many have reached their senior positions by being good at understanding finances, meeting budgets and issuing clear instructions.

But the real world is run by people as well as systems; people who have opinions, feelings, emotions and their own individual needs. Too often individual needs are compromised by corporate needs.

Culture has to be managed

But just because culture is less tangible than finances, this does not give leaders an excuse to ignore it. In fact, because it is less easy to define, it should be at the top of the list of priorities for leaders. Creating an environment where people are inspired to produce great results has to be the mark of a good leader. Running a business without caring about the culture is bound to lead to mediocre performance at best and failure at worst.

So far, technology has not brought a life of leisure. We have more stress and longer working hours than ever before. The developments in technology have outstripped our ability to adjust. Our research for *Conquering Digital Overload* confirms the negative impact

95%

At the Belgian Ministry (FPS) employees decide how fast or slow they want to work. The results after three years' show an incredible number, 95% of employees, prefer this new freedom to the old system with fixed working times.

of technology and our work with clients convinces us that there is a new path for leaders to take to solve the problem.

As the true digital natives take over the world of work, perhaps it will catch up. But will this happen with a smooth evolution led by inspired leaders or will it be a revolution with out-of- touch leaders being toppled by a combination of market pressure and employee dissatisfaction?

We hope it will be the former, but without leaders recognising and addressing their cultures, we fear it will be the latter. ■

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Peter Thomson is a Director of the Future Work Forum and an authority on the future of work and its impact on leadership. He co-authored the best-selling book Future Work and is the main editor of Conquering Digital Overload. He is a speaker and consultant in this field and a visiting fellow at Henley Business School, UK.

Endnotes

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Crowd working and the gig economy: the awakening of a sleeping giant?

Werner Eichhorst and Ulf Rinne consider the ongoing changes in the labour market, but say that the massive upheaval and disruption scenarios do not match the evidence

Digitalization is the buzzword under which many ongoing changes in the labour market are summarized. One aspect, with potentially important implications, is labeled as 'crowd working', the 'gig economy', or the 'platform economy'. It refers to entirely new business models that include new real and virtual services to match demand and supply. It also includes online outsourcing, which may in fact be viewed as a form of (digital) Taylorism. Similar to developments during the industrial revolution, labour can once again be divided into its constituent parts – albeit this time, at least potentially, on a massive, virtual and global scale (Eichhorst and Rinne, 2017).

Potential implications of the new business model

The entirely new business models of the platform economy blur traditional definitions in the labour market. For example, the categories of self-employed and dependent employees appear not sufficient to properly classify and treat platform workers, the concept of a 'firm' cannot be easily applied to virtual companies that operate in the cloud, and also national and country-specific policy approaches, eg. in the area of taxation, are substantially challenged by the global scale of crowd working.

More specifically, standard employment relationships are fundamentally challenged by the platform economy – at least in areas where work does not require specific skills and can be sourced out easily. Following traditional categorizations, platform workers are usually classified as self-employed or freelancers and not covered to the same extent as dependent employees by social security, most notably contributory social insurance. This spurs unfair competition with traditional workers, who no longer act on a level playing field.

Perhaps the most prominent and often cited example is in the transport business, where Uber drivers compete with rather heavily regulated taxi drivers. As a consequence, many self-employed and freelancers also lack appropriate pension insurance. If crowd working is the main activity, the coverage and capacity to contribute to pension insurance and other types of social security is limited. Under current circumstances, platform workers would thus be to a larger extent dependent on tax-financed basic welfare or social security.

Firms operating in the platform economy follow many different business models and only share some common features. This complicates applying a universal approach towards platform firms and their workers. In many instanc-

... the full dimension of the digital transformation is only now emerging, and scenarios of massive upheaval and disruptions are not (yet) matched with the evidence at hand

es, platforms ultimately create their own 'markets' and also define the rules governing these markets. Platforms may regulate market entry, market transactions and data collection. This leads to unfair competition with traditional firms employing dependent employees, parallel labour markets, and an erosion of labour law. Many platforms can effectively externalize social security obligations to their workers, and a possible expansion of freelance work or self-employment could thus undermine the social security model. This has also to do with market structures, as the supply of digital online work usually exceeds its demand by far.

In addition, novel features which characterize the digital economy may lead to substantial challenges in the area of taxation, including an eroding tax base and profit shifting (Li, 2014). These features include strong reliance on intangible assets, massive use of data as a new production factor, new business models, and the difficulty of determining the jurisdiction in which value creation occurs. While these challenges are actually not limited to the digital economy, they become much more acute.

Current dimension of the platform economy

The platform economy has only just begun to unfold its potential. Current empirical evidence indicates that its actual importance is still small. For instance, even in the United States, which plays a leading role in this context, the proportion of the employed persons who offer their services through online platforms is estimated at only 0.5% in 2015 (Katz and Krueger, 2016). At the same time, available data suggest that in most cases these are secondary jobs, and that income from these jobs usually supplements other types of household income. Hence, online platform work can still be viewed as being predominantly a source of additional earnings on top of offline activities.

These findings are confirmed in Bonin and Rinne (2017) for the German labour market. Accordingly, less than 1% of German adults are involved in the platform economy. More detailed results show that about 0.3% of adults are engaged in crowd working, ie. these persons perform online-acquired jobs online (virtual services), while about 0.6%

of adults can be classified as being part of the gig economy, where online-acquired jobs are performed in the real world (real services). Working in the platform economy is more common among men, high-skilled individuals, and younger persons. Also in Germany, most activities in the platform economy can still be viewed as secondary jobs generating additional income.

Despite the empirical evidence that the dimension of the platform economy is still rather small, its growth potential is undoubtedly immense. It has the potential to develop very dynamically and expand to cover a wide range of real and virtual services. The task is therefore to engage early enough with its associated challenges, in particular by establishing a framework for dynamic skill formation and a framework creating a level playing field between different types of suppliers – without impeding digital growth. This is in fact an important constraint as any policy responses have to master a balancing act: on the one hand, they have to accommodate digital growth and promote the chances of digitalization, and on the other hand, it is essential to confine new social inequalities and to avert a digital divide.

Education, training, and lifelong learning

On the individual level, it appears crucial to combat a digital divide by adequately preparing workers for imminent changes. Labour markets will become more complex and more flexible, with profound impacts on employment forms, occupations, and skill requirements. In this context, the focus should be on education, training, and lifelong learning.

In addition, the traditional perspective on occupations may change. Already today more and more occupations share common sets of tasks, skills and competencies – almost independently of the specific job profile, sector or industry. For example, almost every job requires at least some basic IT knowledge, and more and more jobs require also programming skills. This trend will likely continue, also reflecting the fact that data becomes another main production factor in the digital economy (see, eg. Li, 2014).

A fresh perspective on occupations may therefore require to 'unbundle' skills and qualifications, ie. to provide a general set of skills independently of specific occupations. Vocational education and training systems will also have to increasingly focus on providing specific skills in a very dynamic fashion over the entire course of a person's labour market career. Individuals will need to learn and adapt their skills more or less continuously rather than acquiring a fixed set of skills at the beginning of their working life.

With respect to the future development of jobs at different skill levels, there are two very popular, but also entirely different scenarios (see, eg. Hirsch-Kreinsen, 2016). The first of the two scenarios, usually labelled as 'polarization', offers a more pessimistic outlook with a growing gap between complex, high-skilled jobs on the one hand and simple, low-skilled jobs on the other hand.

This growing gap is accompanied by a dramatic decline of jobs in the middle of the skills distribution. In stark contrast, the second scenario offers a more optimistic outlook. Often referred to as 'upgrading', the level of skills and qualifications is assumed to rise across the entire distribution. The increasing use of robots, machines and algorithms leads to an occupational upgrading and a specialization of workers in this scenario.

It is, however, important to realize that these two different outlooks are just scenarios about future developments – reality might still be very different. For example, while a tendency towards employment polarization can be observed in a number of countries, this trend has been, at least so far, clearly less dramatic in Germany than in other European countries (Goos *et al*. 2014; Eurofound, 2015).

In this context, it can be shown that Germany's dual apprenticeship system is related to less employment polarization (Rendall and Weiss, 2016). This proves once again that institutional settings, in this case especially in the area of education and training, can make a difference – also regarding the question whether a scenario of 'upgrading' or a scenario of 'polarization' is more likely.

What should be the appropriate policy response in order to increase the chances of the 'upgrading' scenario as a future outcome on the labour market? First, a general requirement for tomorrow's workforce is referred to as 'up-skilling' (European Commission, 2016). Qualification requirements will most likely increase across the board in the future, and important skills that will be required include creativity, social intelligence, and entrepreneurial thinking (see, eg. Rinne and Zimmermann, 2016). The education system, and more specifically the vocational education and training system, therefore needs to find effective ways to equip workers with the required skills and qualifications.

In this context, Germany's dual apprenticeship system, which combines vocational schooling and structured on-the-job learning (Eichhorst, 2015), may actually serve as a role model – at least with respect to two important aspects that it involves. The first important aspect is its strong demand orientation. It guarantees that graduates' skills are tailored to the demands of the labour market, and it avoids obtaining useless qualifications. The second important aspect are some universal skills that are implicitly promoted, including fundamental problem-solving competencies, a high identification with the employer, a specific working spirit and work ethic, and a general openness for new challenges.

In addition, the need for hybrid and interdisciplinary vocational training models will very likely increase significantly in the future – also in response to the rising complexity of the world of work (BMWi, 2017). This will require, among other things, revised and new curricula that span multiple disciplines and that are more strongly oriented towards real working processes. Hence, stronger cooperation and closer links between educational institutions, training providers, and firms are needed, too.

The good news is that digitalization also offers new possibilities in the area of vocational education and training. These vast opportunities should be adequately used, requiring to prepare students, but importantly also to prepare teaching professionals to effectively and efficiently use the new instruments such as e-learning or blended learning approaches.

A new institutional perspective on workers, firms, and the welfare state

The new business models of the platform economy also require a new institutional perspective on workers, firms, and the welfare state. Challenges with respect to workers concern, for example, the areas of social security and income declaration of platform workers. Another important issue (with many implications, among others in the area of taxation) is finding an appropriate approach for the profit allocation of online or virtual companies.

From a conceptual perspective, the platform economy involves a transfer of risk to individual workers. As online firms and virtual companies usually do not consider themselves as employers, but only as platforms, networks, marketplaces or intermediaries, their workers are formally self-employed, with all the associated risks like accidents or sickness, and costs such as for pensions, unemployment or long-term care (Eichhorst *et al.* 2017).

To deal with this transfer of risks, a first approach is to trace the conventional distinction between dependent employment and self-employment. In this context, the introduction of a third category of workers, next to self-employed and dependent employees, is heavily debated, eg. in the form of 'dependent contractors' or 'independent workers' (see, eg. Maselli, 2016). Also in the United States, the introduction of a new category of 'independent worker' is discussed – specifically to harmonize the social security system with the requirements of the platform economy and to bring it into the digital world of work (Harris and Krueger, 2015).

A second approach is to extend employment-related social security also to employment forms that are currently not included, especially also to self-employment, both in case of online and offline freelancing, and both for main and secondary activities. This applies in particular to social insurance for old age and disability, but also for unemployment (Eichhorst *et al*. 2017).

For example, in Germany only certain groups of 'employee-like' self-employed individuals are currently required to pay into the statutory pension insurance scheme (eg. teachers, nurses). Other groups have access to different or occupation-specific models (eg. artists and journalists, doctors, architects, lawyers). A major advantage of a more universal social security insurance system lies in the fact that the problem of identifying the currently important distinctions between different employment forms, and even occupations, will be mitigated.

Against this background, it seems plausible to bring self-employed workers of all types into the social security system. For example, it may be reasonable to require all self-employed workers to pay at least a minimum amount of contributions into the statutory system. Of course, this would require the self-employed to take taxes and contributions into account when setting their prices.

The contributions of the self-employed workers themselves could also be supplemented by compulsory contributions from the customers or the intermediaries and platforms, which are in the platform economy the equivalent to traditional employers. These contributions could be paid directly or could be claimed by the self-employed when invoicing for their services.

The German model of social security for artists (*Künstlersozialkasse*) is an existing example in which the liability for one part of the contributions is with the users. In addition, a certain percentage of tax financing could be considered – which would, of course, also be generated from tax revenue of platform-based entrepreneurial activities.

Another more general challenge, which requires stronger international cooperation and coordination, is to implement tax liability in the platform economy. Also tax rules have to adapt to a changing business environment in the digital economy. In particular two concepts are hardly applicable for virtual and global firms with intangible assets (Becker and Englisch, 2017a).

The first concept is the so-called permanent establishment. Here, it appears necessary to find a practicable way to also include virtual establishments. The second one is the so-called arm's length principle for transfer prices. As platform firms or digital companies often create their own markets, it is indeed very hard – if not impossible – to find an appropriate comparison to value their goods, services and intangible assets such as very unique patents. While in this context the introduction of a destination-based cash flow tax is proposed in the United States (Becker and Englisch, 2017b), the introduction of an equalization tax is discussed in the European Union (BMF, 2017).

One issue appears to be key in the ongoing debates about social security, taxes, and the welfare state: It is precisely the question if and how virtual value creation can still be located in the real world. Current social security and tax concepts rely on the physical presence of workers and firms in a precisely defined location.

When value-added chains become more and more complex and diffuse, and the role of firms as employers increasingly blurry, it could be reasonable to consider the perspective of consumers in this context. They can rather precisely located in the real world, and therefore shifting the perspective towards consumers in the areas of social security and taxation could mitigate some of the challenges discussed above.

Consumers may serve as the much-needed anchor point through which (employers') social security obligations and taxes can still be determined and collected also the digital economy, for example, via consumption taxes – if intelligent ways can be found to shift their incidence not also from firms to consumers, which also depends on both the demand elasticity and supply elasticity.

Conclusions

Digitalization has indeed the potential to fundamentally change the functioning of our economies and labour markets as we currently know them. However, the full dimension of the digital transformation is only now emerging, and scenarios of massive upheaval and disruptions are not (yet) matched with the evidence at hand.

Nevertheless, from a policy perspective this situation of a gradual transformation offers a window of opportunity to redesign established institutional solutions, in particular regarding skill formation, social protection and taxation. There is no need to panic, but now is time to prepare for the emerging changes. ■

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Transforming business culture

How can we help get employees' brains into a better place where they can work at their best? Hilary Scarlett writes that to create a properly-performing organisation responsible leaders need to understand the brain

Any self-respecting executive would feel it is part of responsible management to know something about the products or services their organisation offers, how the company functions and at least a little about the balance sheet, but how many understand the most important components of what helps any organisation to succeed? The components that enable us to think clearly, make decisions, collaborate, communicate and innovate? The components in question are the brains of those who run and represent the business.

The brain: 1.5kg of tofu-like substance, containing around 100 billion neurons. At one level, the brain is incredibly complicated and there's still much we don't know about it. That said, there are a few basic facts that, if we understand them - every leader, every manager, every one of us – what a difference it makes. We all have good days and bad days at work: days when perhaps we are writing a document and the words are flowing, clear, concise and convincing. But we also all have days when we feel overwhelmed and frazzled and can't think straight; and we have those days where we have deadlines, but nothing too pressing and so we surf the internet, make another cup of coffee and then, at the end of the day wonder what, if anything, we have achieved.

What causes the difference between these days and how we respond to them? When we understand a little about the brain, we can help ourselves have more good hours at work, and we also can help those around us to do the same. Here are a few key things that all responsible leaders and managers need to know.

Our brains are not designed for the 21st century workplace

Our brains have not changed that much since our ancestors were out on the savannah, and we are using brains that in many ways are better at dealing with the savannah than the 21st century workplace. That's a challenge. The human body and brain are designed to deal with surges of stress, but that is all they are meant to be – just surges. For our ancestors in the wild, sudden bursts of cortisol were useful because the hormone helped them to fight or to run away from the threat. Once the predator had gone away, cortisol levels would drop.

Our brains are not designed for the 21st century workplace

The problem now is that we have created work environments where people are frequently under stress and cortisol is constantly in the system. Our brains and bodies respond in a similar way to an over-full inbox as they did to the sabre-tooth tiger. In the long term, cortisol is damaging physically and mentally. We know about the impact of long-term stress on our hearts, but cortisol also damages brain cells in a part of the brain involved in memory formation and storage, the hippocampus. So stress also damages memory. Constant, high levels of stress hormones damage us both physically and mentally.

In the 21st century, lots of things put the brain into this threat state. Before you even walk in the workplace door, personal concerns at home or the difficult journey to work can put your brain into a threat state - too many de-

To create an organisation that can really perform at its best, every responsible leader, and every one of us needs to understand the brain, and what it needs mands on you; having to work with colleagues who you don't particularly like; being micromanaged; thinking that your work is not recognised or is futile; feeling that you don't fit in; conflicting requests; a lack of clear goals; constantly being asked to do more with less; incessant change and uncertainty.

Some of these things we can influence, others we cannot. Lots of things put our brains into this conscious or, more probably, subconscious threat state. Beyond the health and wellbeing reasons, why should responsible leaders care?

Because when we are in this threat state we cannot think straight. It's as if we are looking at the world through a filter of threat – we start to see threats that do exist as being bigger than they really are and we start to see threats where they don't exist.

One group of leaders at a recent masterclass gave an example of this: an email had been sent to some of the group but not all of them. Those left off the list were annoyed and anxious as to why they were not copied in. It wasn't a particularly significant email but being excluded from it became all the more distressing because of the subconscious threat state their brains were already in. An example from another leader: a member of his team, who is usually a high performer, had become difficult, prickly and quick to take things the wrong way. Hearing about the threat response, he realised that the difficult divorce she was going through was leading her to see everything in a threatening way. See Figure 1.

The prefrontal cortex – the Goldilocks of the brain

As long ago as 1908, the psychologists Yerkes and Dodson, created the inverted U of performance (see Figure 2). That's a long time ago but it has stood the test of time. On the vertical axis is the brain's ability to stay focused and perform: at the bottom of this axis, the brain is disorganised and distracted, at the top of the axis the brain is or-

Figure 1. The impact of threat and reward states on our brains and on our ability to think and perform

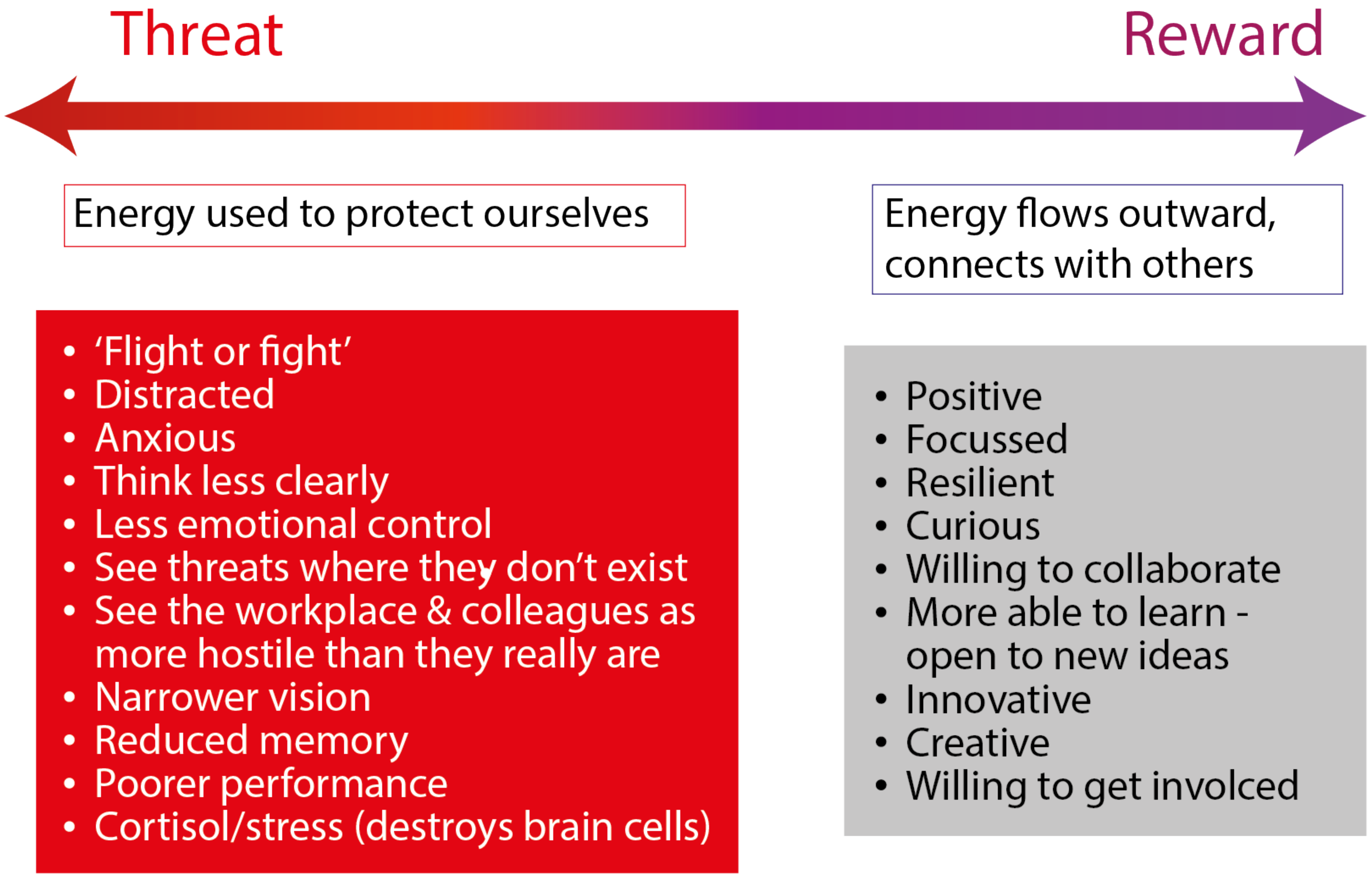
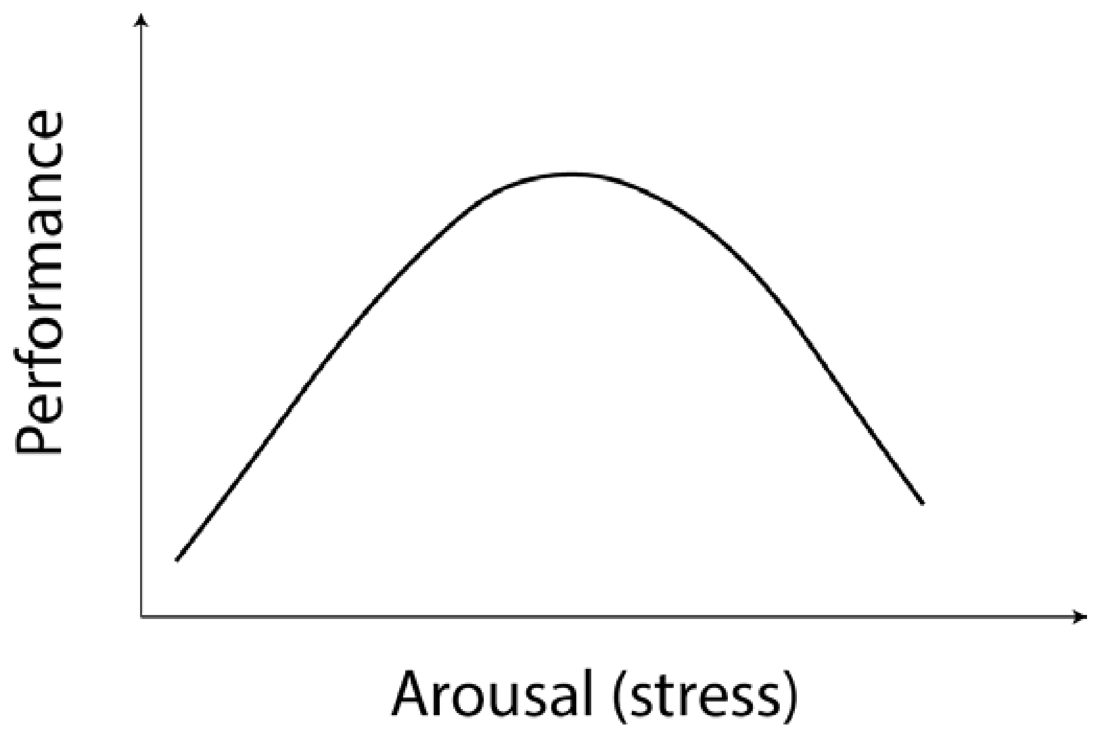


Figure 2. Inverted U of performance - Yerkes-Dodson



ganised and focused. Running along the horizontal axis is the level of stress the brain is under. The top of the inverted U is where we want to be: this is when we are working at our best, we are in 'flow', as it is sometimes described.

The inverted U of performance shows that there is an optimal level of arousal: too much or too little reduces our ability to perform well. So, it is not that stress per se is bad. We need some pressure to get ourselves going. But we do need to find the right balance between the challenge and our ability and confidence to undertake the task.

Too much challenge and we are over on the right-hand side of that inverted U, too little and we are over on the left, not performing at our best in either place. Neuroscientists refer to the prefrontal cortex (PFC) - the part of the brain that is important in terms of decision-making and analytical thinking - as the Goldilocks of the brain: the chemical balance has to be just right for us to be able to work at our best.

To get the best out of people, every leader needs to keep in mind the inverted U of performance. There's a lot of talk in many organisations about 'getting more with less': the inverted U provides a warning. Push people too hard and the PFC will start to close down and people won't be able to think clearly or make good decisions.

So, what can responsible leaders do?

We have more influence over our brains than we probably realise. There are lots of small things we can do that help to get the brain 'back on track'. Here are a few to think about.

Encourage learning

Neuroplasticity is a big word but it betokens good news, especially for those of us who are over the age of 25. Neuroplasticity is the brain's ability to change and make new and stronger connections between brain cells. We used to think that once we hit 25 the brain had peaked and from thereon it was past its best. That is true for some parts of the brain – for instance our hearing isn't going to get any better. The good news is that our brains can learn and change and restructure well into old age.

So the phrase 'you can't teach an old dog new tricks' is not true, so long as the 'old dog' wants to learn. Indeed neuroscientists say that learning is good for the brain. One of the reasons perhaps why our brains begin to slow down and atrophy, is because we don't push them as hard as we did when we were at school or college.

Neuroscientists recommend that we should stretch our brains by learning new things. If we are finding a new skill hard to acquire – good! That is challenging the brain. So, if we are finding it hard to master new skills or systems at work – keep going. Learning is good for the brain.

Set short-term, achievable goals

If people are struggling, help them to set short-term goals that they can achieve. Achieving a goal activates the reward centre in the brain and changes its internal chemistry. It helps to put us in the right-hand box in Figure 1. This in turn puts the brain in a better place to take on the next challenge.

Make time for people

We have hugely underestimated people's need for social connection. We recognise in our personal lives that relationships matter but for some reason expect employees to be less concerned about this at work. Neuroscience shows that this is a mistake.

Feeling that we are part of a team changes the chemicals in our brain. If we feel we belong, that someone at work is interested in us, our brains are on the right-hand side of Figure 1. Social rejection, feeling part of an 'outgroup' negatively affects our IQ, our memories, our staying power, and our ability to reason. Good relationships at work are not just nice to have, they boost our brain power.

This article touches on a few of the ways in which we can help get employees' brains into a better place where they can work at their best. To create an organisation that can really perform at its best, every responsible leader, and every one of us needs to understand the brain, and what it needs. ■

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Hydrogen: the missing link for the energy transition

Nicolas Kraus discusses hydrogen technology and how it can contribute to meeting the climate goals set for Europe

Hydrogen is becoming one of the major energy carriers of the 21st century. With renewable energies, it provides a solid foundation for the development of the energy economy of the future. Thanks to its particular characteristics, hydrogen technology is able to contribute to achieving the climate goals set for Europe by 2050, and to translate them into economic activities.

Hydrogen is indeed a key component of the future of energy systems that will accelerate the transition to 100% decarbonised systems, in particular to solve the problem of the intermittency of renewable energies and the rapid decarbonisation towards 'zero emission' transportation and energy systems. It presents opportunities in terms of job creation, technological leadership, and environmental protection for Europe.

The hydrogen economy is already a hundred billion-dollar market worldwide. It is today mainly used for the production of fuels (50% of the market), fertilizers (43%) and various industrial processes (6%) such as the production of glass, iron, as well as various food products such as margarine.

Other uses of hydrogen exist but are still marginal on a global scale with 1% of the market: the propulsion of vehicles - cars, buses, trains, boats, the production of electricity and heat for commercial use and residential, renewable energy storage in the form of hydrogen, or substitution of natural gas with hydrogen in industrial and domestic applications. Indeed, hydrogen enables sectoral integration.

The ability of power-to-hydrogen to access and integrate each sector of the energy system opens up the opportunity for deploying and utilising renewables to a much greater extent. Power-to-hydrogen systems can be implemented within the electricity grid utilising long-term power purchase, guarantees of origin, in accordance with providing energy storage ancillary services for managing renewables in electricity grids and in direct combination with renewable power sources.

Whereas electricity derived from renewables provides the power sector with a profound decarbonisation pathway, the heat and mobility sectors as well as industry do not yet have decarbonisation pathways of equivalent significance. The versatility of hydrogen enables these sectors to be integrated and to contribute to Europe's energy transition.

These uses are, therefore, likely to grow for four reasons, as they offer:

1. A solution for seasonal storage of renewable energy in large quantities to promote the development of local energy in Europe and limit energy dependence:

... many of the opportunities offered by hydrogen have not been exploited, particularly because of regulatory or legislative barriers

Renewable power generation is characterised by variability and intermittency. As the renewables' penetration increases, the problem of balancing supply and demand for operators of electricity networks also rises. Periods of non-consumption-oriented production of renewable energy are usually managed by curtailing renewable power sources because the electricity cannot be sold at the time of generation.

For example, in 2015 Germany curtailed 4.7TWh of renewable electricity and re-dispatching costs for Germany and the UK were €1 billion in 2016. It has been estimated that curtailment could amount to 30% of Germany's electricity consumption by 2050 unless methods for storing and making use of this energy are implemented.

Power-to-hydrogen technologies in a power system integrating high penetration of Renewable Energy Sources (RES) can operate throughout long periods of non-consumption-oriented production of renewable energy by feeding hydrogen into one or more energy sinks (eg. the gas grid, the storage tanks of hydrogen refuelling stations, and salt caverns). Stored hydrogen can be used on various timescales for satisfying demands for heat, transport, power or industry achieving high utilisation and absorption of energy.

Production of hydrogen (or synthetic natural gas derived from hydrogen and carbon dioxide (SNG)) for injection into the natural gas grid is usually referred to as power-to-gas (P2G). It is currently being demonstrated at approximately 15 sites across Europe. As a major energy conveyor, the gas grid offers an extant energy sink for renewables and, unlike the power system, has a large inherent storage capacity in the TWh scale. Therefore, power from the electricity grid can be transferred readily to the gas grid via P2G.

Hydrogen can also be easily produced by replacing natural gas by biomethane in Steam Methane Reformers (SMR): when using hydrogen produced from biomethane, ie. from wastes, it will boost the circular economy by giving other market opportunities to biogas.

2. An electro-mobility solution. Fuel Cell Electric Vehicles (FCEVs) have a fast fefuelling time (maximum 5 minutes

for 500 km) and are particularly well-suited for heavy-duty or frequent rotation vehicles such as taxis, utility vehicles, trucks, buses, trams, trains. Zero-emission maritime applications are also emerging.

This hydrogen-based electromobility also has great potential for employment and innovation leadership in Europe (in fact, nearly 1,400 units are assembled for a fuel cell vehicle compared to only 200 for electric battery vehicles). Green hydrogen offers a higher energy density than green electrons stored in today's batteries and therefore provides greater autonomy for transport and energy applications than purely battery electric systems.

Hydrogen refuelling stations (HRS) incorporating on-site electrolysers are producing, storing and dispensing hydrogen to FCEVs in accordance with grid balancing requirements (eg. as part of the dynamic Firm Frequency Response service in the UK). The essential hydrogen storage capacity at each station enables production to be decoupled in time phase from demand for refuelling FCEV. In other words, hydrogen can be produced at the HRS when it contributes to stabilising the power grid.

Furthermore, the required electrolyser capacities, and the need to implement significant numbers of HRS in a geographical distribution matches well with the power sector's requirements for balancing increasing amounts of renewable generation in distribution networks. In the coming years, as the numbers of FCEVs (cars, buses, vans and other vehicles) increase, the aggregate electrical load of electrolyser-HRS will become significant for grid balancing at a national level.

This approach is advantageous for further decarbonising both the mobility and power sectors. It facilitates the use of much higher efficiency road vehicles, so reducing the energy requirement for road travel while shifting it to a sustainable energy resource.

Additionally, the use of hydrogen in the mobility sector reduces direct (CO_2) and indirect (eg. NO_x and SO_2) GHG emissions so contributing to a decrease in health concerns. Progressive utilisation of such vehicles will foster zero emission transport in urban zones, hydrogen eco-systems and corridors between cities/countries so solving the infrastructure development situation.

Moreover, grid-connected long-term power purchase with renewable energy sources, guarantees of origin, and direct connections offer pathways that certify the renewable character of the hydrogen and enable increasing its share at European and national level.

3. A decarbonisation solution for industrial processes through the use of green hydrogen (produced from renewable energy), particularly in the chemical and iron and steel industry.

Hydrogen is today widely used in industry and almost entirely produced by fossil fuels, with a related CO_2 footprint. Using green hydrogen produced from renewables will increase the share of renewable energy sources in industrial processes. As the industry is cost sensitive, green hydrogen needs to serve applications where it offers most benefits.

Steel manufacturing processes offer one such application. One process to produce steel is to use hydrogen for the reduction of ore. Several initiatives are on the way in Sweden, Austria, and Germany; partly supported by European funding.

Refineries could also utilise green hydrogen to decarbonise their refining processes. Today, global hydrogen production is at 55 million metric tons annually. Out of this, ±40% is consumed at refineries. Utilising Power-to-Hydrogen could therefore have a significant beneficial effect on the overall system decarbonisation.

Fuel producers are obliged to reduce CO_2 in their supply chain. This CO_2 reduction can be achieved by using green hydrogen in the refinery process. Although the costlier green hydrogen doesn't compete yet economically with hydrogen produced from fossil hydrocarbons, it does compete with biofuels.

To achieve this, regulations should provide non-discriminating rules that allow the use of hydrogen in the upstream fuel processes in a fair competition (both in price and GHG mitigation potential) with biofuels to fulfil the obligations for the renewable share in liquid fuels, therefore helping to reduce the dependency of the European Union on natural gas whilst contributing to the reduction of palm oil consumption.

Hydrogen can also be used as a green synthetic substitute for many different applications in the fuel and chemical sectors. Methanol, for example, is a liquid chemical with many different possibilities of application.

4. A decarbonising pathway for the heating sector through either a fuel switch or technology update. Hydrogen and hydrogen admixtures can be used as an alternative to natural gas for space heating, water heating and gas cooking. Hydrogen admixtures or hydrogen can be distributed via the existing gas grid, thus making use of the large available infrastructure asset.

Because heat is by far the largest energy demand and has the greatest seasonal variation (disparity between high demand in winter, in times of low RES generation, and high RES generation in the summer), P2G can be applied to decarbonise gas networks and ultimately store excess renewable energy produced in the summer for release in the winter. Therefore, P2G can make a major contribution to decarbonising the heating sector and decreasing our dependency on natural gas imports.

The natural gas infrastructure is progressively decarbonising through the introduction, in the short-term, of biomethane and, hydrogen with low concentration admixture or as SNG without requiring any changes to the infrastructure or gas appliances.

Long-term objectives of full decarbonisation should therefore focus on enabling increasing shares of hydrogen, SNG and biomethane with needed standardisations. In order to maximise efficiency in the energy system, combined heat & power (CHP) should be utilised. Fuel Cell CHP has been deployed for commercial and district heat at scale for several decades. Micro-CHP fuel cells are today being deployed in Japan with 190,000 units expected to be installed. Meanwhile the largest European project (PACE) is aiming at 2,650 units.

Hydrogen and fuel cell technologies offer much-needed solutions as governments work to deliver on their ambitious decarbonisation targets and commitments set forth by the Paris Agreement. A study of the Hydrogen Council, *Hydrogen, scaling up* released at the COP23, shows that worldwide, hydrogen could help reduce the annual CO_2 emissions by 6 gigatons - 20% of the abatement need required to limit global warming to 2 degrees Celsius - by enabling higher share of renewable energy in the energy mix and by decarbonising applications in transport, industry energy, heating and power.

Hydrogen also serves as a feedstock using captured carbon, while generating a €2 trillion global market and creating high added value jobs for 30 million people (with up to €52 billion market and 800K new jobs by 2030 potential in Europe).

It is now a question of knowing where Europe's position will be with regard to the use of this new energy vector. Are we going to import the technologies or are we going to create a new export industry? So far, the European Union (EU) has taken the lead, with companies exporting their technologies to the US, Korea and Japan, but for how long will the EU remain a pioneer in this sector, which requires support at European, but also national, regional and local level.

In order to accelerate the deployment of hydrogen and fuel cell technologies in Europe as well as at regional and local levels, Hydrogen Europe, together with the European Public-Private Partnership for Hydrogen and Fuel Cells (FCH JU), has created a new initiative to help regions/cities to develop projects in the hydrogen and fuel cell sectors - and to bring them together with European industry.

The initiative aims to:

- Support regions to evaluate hydrogen and fuel cell applications in business cases and assess their potential
- Identify and optimize the use of different financing options by sharing information on financing/financing options for hydrogen projects and public-private fuel cells
- Gather public funding at European level (FCH JU, European Investment Bank EIB, EFSI, EIF, ERDF), national (eg. Caisse des Dépôts Group) and regional
- Put forward private financing, eg. industrial self-financing (jointly supported by users and manufacturers or other industrial players) or private finance (private equity players, venture capital funds, high-tech funds)
- Support regions/cities in the promotion of technology - for example in the context of their 'smart specialization strategies'
- Develop roadmaps and concepts to prepare and implement deployment projects from 2018

Among the many regions that establish a hydrogen roadmap, we are proud to have a French champion region namely the Auvergne Rhône Alpes region which has just received confirmation from the EU that €10.1 million will contribute to the installation of 20 hydrogen charging points and 1000 vehicles equipped with hydrogen fuel cells.

That's excellent news! And we look forward to more such projects in the coming years, but that will have to go hand in hand with legislative decisions that allow the industry to thrive.

However, many of the opportunities offered by hydrogen have not been exploited, particularly because of regulatory or legislative barriers.

An adaptation of the Renewable Energy Directive is currently being discussed at European level. It is essential that the text puts the different technologies on an equal footing, insofar as they allow both the integration of renewable energies in the transport sector, as well as the decarbonisation of mobility and further, to push for the creation of a green industry in the European regions. ■

Nicolas Kraus is EU Policy & Regulatory Affairs Manager at Hydrogen Europe

Hydrogen Europe is the leading organisation that brings together many companies - from SMEs to multinationals - and European research institutes that are mobilising to promote the wider use of hydrogen as a new energy carrier in the economy, and fuel alternative and low-carbon raw material in the mobility and industry sectors. Hydrogen Europe represents more than 115 industrial companies 65 research organizations and 10 national associations. The association is partnering with the European Commission in the public-private partnership Fuel Cells and Hydrogen Joint Undertaking (FCH JU) to accelerate the market introduction of clean technologies in the energy and transport sectors.

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International events highlight responsible development of business aviation around globe

Safe and responsible business aviation is enabled by key industry events, Ed Bolen reviews upcoming trade events and conferences

In addition to its more than 70 years of advocacy on behalf of business aviation operators across North America, the NBAA also encourages safe and responsible business aviation operations around the globe. One of the most effective methods for sharing this message is through key industry events and trade conferences.

At the forefront of these efforts is NBAA's International Operators Conference (IOC2018), taking place 26-29 March in Las Vegas, NV. This annual event provides operational, regulatory and real-life information critical for safe, efficient and compliant international business aviation operations.

Attendees at IOC2018 will receive the latest information about international regulations and security; receive important updates from every ICAO region around the world; and learn about the latest technological innovations affecting the industry. They will also have opportunities to exchange best practices with other global operators, and network with international service providers.

NBAA also promotes this vital industry's growth and development around the world through its support for influential international business aviation gatherings in China and Europe. For example, the Asian Business Aviation Conference & Exhibition (ABACE) is the premier event dedicated to showcasing business aviation's impact throughout China and the Asia-Pacific region.

Co-hosted by NBAA, the Asian Business Aviation Association (AsBAA) and the Shanghai Airport Authority (SAA) and coming to Shanghai, China on 17-19 April, ABACE2018 is the perfect venue for investors considering aviation as a business opportunity; companies thinking of using an aircraft for business; and flight departments that have long used aircraft as a valuable business tool.

Over the past seven years, ABACE has grown to become a must-attend event not only for industry stakeholders in China and throughout the Asia-Pacific – including business aviation leaders, entrepreneurs, flight department personnel, aircraft-purchase decision makers and other high-level attendees – but also for the worldwide business aviation community.

Officials throughout the region have also recognized the event's important role in driving the integrated development of cities and airports, as part of the greater effort to help facilitate the development of general aviation in China, and its significance as a critical industry throughout the Asia-Pacific.

I invite the readers of World Commerce Review *to consider attending one of these impressive events in the coming months to experience the strength and diversity of our industry firsthand*

The following month will bring the European Business Aviation Convention & Exhibition (EBACE2018) to Geneva's Palexpo Convention Center. Taking place 29-31 May in Geneva, Switzerland, the convention will bring together business leaders, government officials, manufacturers, flight department personnel and all manner of people involved in nearly every aspect of business aviation.

Jointly hosted each year by NBAA and the European Business Aviation Association (EBAA), the leading association for business aviation in Europe, EBACE is Europe's largest event showcasing business aviation products and services.

Industry professionals from throughout Europe and around the world will benefit from informative presentations and educational sessions, as well as opportunities to network with their peers to exchange knowledge and best practices. More than 450 exhibitors will be on hand at EBACE2018 showcasing the latest products and services, with dozens of business aircraft of all sizes, and for a variety of missions, on static display.

Another key aspect of EBACE is its ability to bring together influential leaders, government officials, and key industry stakeholders to discuss regulations and policies of importance to not only European business aviation operators, but to the industry across the globe. This important role will continue in 2018.

Changes at Geneva Airport to benefit EBACE attendees

This year, EBACE attendees will find also several changes at Geneva Airport (LSGG) – located adjacent to the Palexpo – aimed at benefitting all stakeholders, including business aviation operators. For example, refinements to the Prior Permission Required (PPR) system for coordinating general aviation slots are expected to optimize efficiency and capacity at the Swiss airport. Prior to December 1, parking and slot coordination was handled by airport FBOs, with reservations available up to 21 days in advance of an intended flight. Since the December 1 system change, reservation availability may still be viewed 21 days ahead of a flight, but slots are now available from FBOs five days ahead of an intended trip.

The new approach will allow for more flexibility, accommodating scenarios such as the need to change an aircraft due to maintenance or other issues. Efficiency and slot availability will also be increased, because a new 'match requirement' – under which operators will file a flight plan, then request a slot reservation – will ensure that files containing mismatches between flight plans and slot requests are not included in the system.

In a related development, construction remains underway to increase overall airport capacity by 2019. This work requires a temporary reduction in aircraft parking capacity, and towing into marked parking areas, but the ultimate result will be greater space for airport users.

The changes are the result of cooperation between the Geneva Airport Authority, EBAA Switzerland, the Geneva Business Aviation Association and other user groups. They represent meaningful developments that benefit business aviation operations, increase efficiencies and add capacity at Geneva Airport. Additional refinements may be made over time to further improve efficiencies based on operator feedback.

NBAA remains committed in 2018 to protecting and promoting the global development of business aviation as a vital, safe and secure industry. On behalf of the more than 11,000 members of NBAA, I invite the readers of *World Commerce Review* to consider attending one of these impressive events in the coming months to experience the strength and diversity of our industry firsthand. ■

Ed Bolen is President and CEO of the National Business Aviation Association (NBAA)

Safety with service

Q&A

In a wide-ranging interview *World Commerce Review* talks to Simon Williams, the Isle of Man's Director of Civil Aviation, about the continued success of the Island's aviation services sector as it celebrates 10 years as a leading aircraft registry

Congratulations on achieving 10 years as a leading aircraft registry; what moments stand out for you?

Thank you very much - that is very kind of you.

The Registry commenced operations on 1st May 2007 and has grown to become the world's 6th largest private/corporate business aviation register whilst maintaining the highest relevant aviation regulatory safety standards.

As our 10th anniversary year draws to a close, the realisation of what we have achieved as a team definitely stands out. There have been many high points. We are very proud of the success of the Isle of Man Aircraft Registry so far but equally we take none of it for granted.

The most satisfying moments stem from when we have been able to make a real difference to the substance of our operation for the benefit of our clients. Some examples include:

- We have gone completely digital and operate a paperless office. All of our original certificates and associated documentation is authenticated and promulgated digitally, reducing courier costs and saving clients significant amounts of valuable time. To the best of our knowledge we are the first aircraft registry to achieve this.
- We have successfully introduced a digital information system which has vastly improved efficiency and eliminated the in-house error rate to virtually zero. This has resulted in a step change reduction to the work load demands placed on the team allowing for much more flexible and responsive operations, so saving our clients further significant time.
- Recognising that business aviation operations are 24/7/365 and that we are responsible for business aircraft

across the entire globe (incorporating most time zones) we successfully launched on line services. They now form a key part of our service, allowing clients to access important information on line even when the office is closed.

- Introducing ICAO Annex 6 Part II Section 3 to our aviation legislation thus bringing our safety standards to the highest appropriate levels.
- Cape Town Convention becoming operational on the Island.
- Repatriating the aviation legislative process to the Island from the UK thus allowing us to ensure that we can be highly nimble and responsive to changes in international aviation law and regulation, so setting the best possible conditions for an international business aviation industry.

The Isle of Man Aircraft Registry has gained an excellent, award winning reputation for the registering and ongoing safety oversight of private/corporate business jets

- Recognition of our regulatory excellence by European member state National Aviation Authorities (NAAs) which has allowed for Letters of Understanding to be signed between IOMAR and those NAAs. The benefit being enhanced cooperation between states thus avoiding any potential for duplicated or contradictory oversight, so allowing Business Aviation to flourish unhindered by unnecessary bureaucracy.

What is the strategic plan for the next 10 years?

The last three years has witnessed the delivery of some major strategic goals. So for the most part and in simple terms, it is to continue to incrementally build on the foundations laid thus far.

That said, we have so much more planned for the future and are passionate about incrementally/appropriately raising standards of safety and regulatory oversight whilst providing the best possible support to our much-valued client base. There are always opportunities to enhance the efficiency of our operation and we constantly focus on making improvements in this regard.

A key element will be to make the most of repatriating the aviation legislative process to the Island. We intend to make the most of this opportunity by maintaining the highest appropriate levels of ICAO compliance whilst ensuring that the Island aviation legislation is 'bang up to date' by incorporating law and best practice from the UK, Europe and beyond. As a responsible and proactive jurisdiction we intend to set the best possible conditions for Business Aviation and its supporting industries to flourish in a safe, efficient and compliant manner.

How has the sector changed over the last decade and what does the next one hold?

Those that know me know that I am a passionate advocate of this great industry so I will always adopt a positive perspective. I firmly believe that business aviation has a great story to tell.

There have been periods of remarkable growth, technological advances, new companies appearing and some very positive developments. As with any industry there have been highs and lows and business aviation has faced many challenges over the last decade, with the financial crash being the most obvious low point.

With the future in mind, I have noted several reports recently that highlight sustainable growth in business aviation traffic movements in Europe and beyond. There are more significant technological developments coming too. Hopefully these are indicators that the industry is moving on from what many commentators have described as being flat market conditions.

I have great faith in the resilience and resourcefulness of the people that make up the business aviation industry. They are clever, determined and passionate about what they do. Thus I am robustly optimistic for the future and firmly believe that the industry will always find a way to succeed.

What is the difference offered by the Isle of Man for clients?

The Isle of Man Aircraft Registry has gained an excellent, award winning reputation for the registering and ongoing safety oversight of private/corporate business jets. Our motto is safety with service. This simple phrase encapsulates what we have sought to achieve from the outset. Although much is made of the aircraft numbers, growth and success associated with the Registry, our focus is on 'doing the right thing', and that is striking that fine balance between facilitating high regulatory standards whilst delivering excellent customer service. If we work hard at getting that balance right and delivering with real substance, then the numbers and growth should look after themselves.

The principal benefits of registering an aircraft on the Isle of Man are:

- High regulatory standards
- Excellent customer service levels and award winning international reputation
- Neutral nationality registration prefix 'M'
- Competitive scheme of charges
- Secure mortgage register
- Cape Town Convention
- No insurance premium tax
- European time zone
- Professional infrastructure with significant experience in aviation finance
- The Isle of Man is on the OECD 'white list' of countries complying with the global standard for tax co-operation and exchange of information
- Clear and simple taxation regime
- Stable legal and political environment

What types of aircraft do you work with?

The Isle of Man Aircraft Registry was established to provide a customer-focused service for the registration, and subsequent safety regulation of high quality private/corporate jets and twin turbine-engine helicopters.

With regards to the aircraft we work with, we have some simple ground rules that have served well and stood the test of time:

- Aircraft may only be operated for private or corporate purposes whilst on the Register - commercial operations are not permitted;
- Owners of Isle of Man registered aircraft must be qualified under the Air Navigation (Isle of Man) Order 2015 as amended;
- Aeroplanes with MTOM of 5,700 kg or above may be registered;
- Aeroplanes with MTOM between 2,730 kg and 5,700 kg may be considered if accompanied by significant economic benefit to the Isle of Man private sector;
- Aircraft of any weight owned by Isle of Man residents (N.B. aircraft must be Type Certified);
- Aircraft between commercial leases;
- Twin turbine-engine helicopters.

Based on these ground rules the aircraft we register are centred on client needs and cover a wide spectrum.

We strive to foster excellent working relations with all the Business Aviation manufacturers and go to great lengths to provide them with the very best support and this has spin off benefits for our clients of course too.

What advice would you give the first-time operator?

In general terms, my advice would be to choose your advisors very carefully. Aviation is a wonderful industry and used wisely a business jet can be a superb enabler. However, there are aspects of purchasing, owning and operating an aircraft that can be complex and these require specialist advice. Timely, impartial expert advice is critical to avoiding potential pitfalls.

From a Registry perspective, I would strongly encourage the first-time operator to commence a dialogue with the Isle of Man Aircraft Registry at the earliest possible opportunity. It is not uncommon for the Registry aspects to be left until the very last minute and right at the end of a complicated purchase transaction process. Timely and effective communication from the outset is an excellent way to avoid some very simple challenges thereby eliminating any potential for unnecessary and frustrating delays.

What additional expertise is available in the Isle of Man?

The Isle of Man has become a centre of excellence for those seeking advice on the initial purchase, ongoing ownership and safe operation of a business jet. In effect it has become a 'one stop shop' for those needing specialist expert advice across the entire spectrum of business jet matters.

For aviation safety and regulatory matters please speak to the Isle of Man Aircraft Registry team:

- Telephone: +44 (0)1624 682 358

- Fax: +44 (0)1624 682 355
- Email: aircraft@gov.im
- Web: https://www.iomaircraftregistry.com/

Address: Ground Floor, Viscount House, Ronaldsway Airport, Ballasalla, Isle of Man, IM9 2AS, British Isles

We also provide an Aviation Business Directory for specialist advice on legal, tax, importation and other matters which can be downloaded from our web site at:

- https://www.iomaircraftregistry.com/about-us/overview/isle-of-man-aviation-directory/

In conclusion, how would you sum up the last ten years?

Demanding…great fun…professionally and personally very satisfying. I am very lucky to work with a fantastic team and that makes all the difference. I look forward to the next ten years with great enthusiasm. ■