

LIZARD BRAIN

Can Neuro-economics help in COVID times?

By Bart Le Blanc

If you ask a Lizard to plan for the future, you can expect very steep discount rates!

Threat and uncertainty feed instinctive behaviour (Lizard Brain reaction). In economic terms this translates in diminished appetite for spending and investing for the future. Savings rates go up and some economic sectors are faced with extinction (e.g. business and holiday travel, entertainment, shopping centres).

The discipline of 'neuro economics' may contribute to a better understanding of economic decision making in uncertain times. Can it also guide policy makers towards effective action through counterbalancing instinctive negative biases?

Short term fiscal and monetary support combined with a transformative policy agenda is part of the recipe bringing hope.

And hope might bring confidence and create space for the 'Logical Brain' to prevail.

1. Balancing public and economic health under the COVID pandemic; can it be done?

The new IMF's World Economic Outlook reveals the true nature of a global public health crisis culminating in a series of major socio-economic nightmares.

To summarize the gist: Yes, the world economy may shrink a little bit less this year than earlier forecasted, but the pain will be felt for much longer. The possibility of repeated waves of infections and new lockdowns feed economic uncertainty and undermine confidence of consumers and producers alike.

The IMF now predicts that the economic contraction in 2020 might be somewhat smaller than earlier expected (global GDP -4.4% for the year compared to -4.9% in the June outlook), but the recovery for 2021 is more uncertain and definitely less buoyant.

The geographical differences in the forecasts are shocking as highlighted by two extreme forecast changes: the IMF expects the US GDP dip in 2020 to be 'only' -4.3% instead of the June prediction of -8.0%, but in India which is equally suffering from very high COVID levels might experience a much steeper GDP fall of -10.3% instead of an earlier forecasted drop of -4.5% (see key indicators in table below).

That is devastating for many emerging economies as they lack the room for manoeuvre for fiscal support programmes. Furthermore, they are struggling with weaker public health and education systems

The IMF rings the alarm bell as it notes that for the first time in more than 20 years extreme poverty is expected to increase.

Table 1.1. Overview of the World Economic Outlook Projections
(Percent change, unless noted otherwise)

	2019	Projections		Difference from June 2020 WEO Update ¹		Difference from April 2020 WEO ¹	
		2020	2021	2020	2021	2020	2021
World Output	2.8	-4.4	5.2	0.8	-0.2	-1.1	-0.5
Advanced Economies	1.7	-5.8	3.9	2.3	-0.9	0.3	-0.6
United States	2.2	-4.3	3.1	3.7	-1.4	1.6	-1.6
Euro Area	1.3	-8.3	5.2	1.9	-0.8	-0.8	0.5
Germany	0.6	-6.0	4.2	1.8	-1.2	1.0	-1.0
France	1.5	-9.8	6.0	2.7	-1.3	-2.6	1.5
Italy	0.3	-10.6	5.2	2.2	-1.1	-1.5	0.4
Spain	2.0	-12.8	7.2	0.0	0.9	-4.8	2.9
Japan	0.7	-5.3	2.3	0.5	-0.1	-0.1	-0.7
United Kingdom	1.5	-9.8	5.9	0.4	-0.4	-3.3	1.9
Canada	1.7	-7.1	5.2	1.3	0.3	-0.9	1.0
Other Advanced Economies ²	1.7	-3.8	3.6	1.1	-0.6	0.8	-1.0
Emerging Market and Developing Economies	3.7	-3.3	6.0	-0.2	0.2	-2.1	-0.5
Emerging and Developing Asia	5.5	-1.7	8.0	-0.9	0.6	-2.7	-0.5
China	6.1	1.9	8.2	0.9	0.0	0.7	-1.0
India ³	4.2	-10.3	8.8	-5.8	2.8	-12.2	1.4
ASEAN-5 ⁴	4.9	-3.4	6.2	-1.4	0.0	-2.8	-1.5
Emerging and Developing Europe	2.1	-4.6	3.9	1.2	-0.3	0.6	-0.3
Russia	1.3	-4.1	2.8	2.5	-1.3	1.4	-0.7
Latin America and the Caribbean	0.0	-8.1	3.6	1.3	-0.1	-2.9	0.2
Brazil	1.1	-5.8	2.8	3.3	-0.8	-0.5	-0.1
Mexico	-0.3	-9.0	3.5	1.5	0.2	-2.4	0.5
Middle East and Central Asia	1.4	-4.1	3.0	0.4	-0.5	-1.3	-1.0
Saudi Arabia	0.3	-5.4	3.1	1.4	0.0	-3.1	0.2
Sub-Saharan Africa	3.2	-3.0	3.1	0.2	-0.3	-1.4	-1.0
Nigeria	2.2	-4.3	1.7	1.1	-0.9	-0.9	-0.7
South Africa	0.2	-8.0	3.0	0.0	-0.5	-2.2	-1.0
<i>Memorandum</i>							
Low-income Developing Countries	5.3	-1.2	4.9	-0.2	-0.3	-1.6	-0.7
Middle East and North Africa	0.8	-5.0	3.2	0.7	-0.5	-1.8	-1.0
World Growth Based on Market Exchange Rates	2.4	-4.7	4.8	1.4	-0.5	-0.5	-0.6
World Trade Volume (goods and services)	1.0	-10.4	8.3	1.5	0.3	0.6	-0.1
Imports							
Advanced Economies	1.7	-11.5	7.3	1.7	0.1	0.0	-0.2
Emerging Market and Developing Economies	-0.6	-9.4	11.0	0.0	1.6	-1.2	1.9
Exports							
Advanced Economies	1.3	-11.6	7.0	2.0	-0.2	1.2	-0.4
Emerging Market and Developing Economies	0.9	-7.7	9.5	1.6	0.2	1.9	-1.5

Source: IMF World Economic Outlook, October 2020

This is all frightening reading, the more so when one realises that the outlook preceded the current second wave of corona infections and new lockdown measures. The worries about the socio-economic impact of these measures are the main topic of political debate across the world.

In many countries this debate is dominated by politicians weighing the need for stringent public health action to prevent the spread of the virus and prevent health services from becoming overburdened, with the impact of such stringent measures on social and economic life of citizens and companies.

With so much uncertainty on all fronts, forecasting and modelling has become a real challenge.

The traditional economics assumption of *rational choice* by people when making decisions as consumers and/or producers on buying, or selling, or investing, or saving is severely tested and contested.

But it touches the core of the debate on if, and how to balance public health action with the interest of the economy, businesses and people's livelihoods.

What new insights could help improve the debate and socio-economic policy making?

2. Economics, psychology and neuroscience.

When students are introduced to the basics of economic theory, they usually first meet with Adam Smith, the seminal 18th century father of economics.

Central to his view was the function of markets and their price mechanism governed by the 'invisible hand'.

This hand assumes the battle of supply by multiple producers on the one hand, and demand from zillions of consumers on the other, to be won in a victory for all with a finally balanced equilibrium price. Every party in this balancing act behaves rationally. They are all driven by the desire to produce, sell and purchase for their individual utility and our economic models predict and forecast on that basis.

However, most of the time economic reality does most of the time not follow the model and forecasts are frequently wrong. As a result, economists are constantly defending their theory by ex-post explaining why reality did not behave as the models had forecasted (never questioning the value of the modelling).

The behavioural economists have tried to bring the answers by introducing psychology and empirical statistics into economics.

Daniel Kahneman and Amos Tversky were psychologists and mathematicians by training and became leading lights of this new school of thought in the 1990s (Kahneman was awarded the Nobel Prize for Economics in 2002; by that time Tversky had unfortunately passed away in 1996).

They introduced the well-developed psychology concept of two modes of thinking into the economic theory:

- System I which dominates human response through automatic and quick and intuitive reactions, and
- System II which takes its time and uses effortful mental activities, including complex computations, concentration and considered choices.

Can behavioural economists identify *when/why* economic decision making will be following System I or System II?

If not, could neuroscientists help!??

While linking economics with psychology was a big shock to the system, the steps taken towards integrating concepts of neuroscience into economic modelling opens a whole new challenging and mind-boggling chapter.

Trying to get a feeling for this, it meant for me back to the (virtual) classroom and starting from scratch to read up on the basics of the brain and the neural system.

A very personal experience....



Before starting to comment on the possible contribution of neuro economics to the current COVID-19 economic policy debate, I wanted to get to know more about the basics of neuroscience. I turned to my friend Catherine D. (a post-graduate neuroscience student) to help me on my way.

Researching the brain was a new experience for me. I had never before paid much attention to things that are going on inside the body. However, it was fascinating and challenging mentally and physically.

I use the word physically on purpose, and I say this with a certain amount of trepidation. I was totally unprepared to experience the physical awareness of the subject of my studies.... Yes, when reading about the brain and looking at pictures of the cerebral cortex, the limbic areas, the brain lobes and their different functions, I really felt my own jelly walnut brain. It was as if my brain was signalling: 'Yes, I know you are talking/thinking about ME and how wonderful I am!'

It was a unique, physical experience which I can't remember ever having had before. At the same time, I was glad that I was not studying some other body parts 😊.

Some basic facts of the Brain.

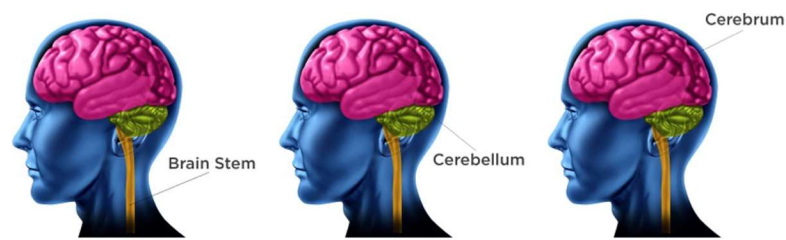
In order to assess the potential contribution neuro economics can make to a better understanding of political economics, I need to first take you with me in my amateur research into some of the basic facts of the brain and the evolution of its functions (with apologies for maybe sounding a bit pedantic).

Do I need to say how brilliant the human brain is? It forms you and everyone else and thus the world. It makes decisions. It is the source of imagination and dreams and also calculations and exploitation. It determines relationships and societies and policies. It works 24/7, even when you sleep. And "when it stops, so do you" says David Eagleman prosaically in his excellent book '*The Brain, the story of you*' (also BBC TV series). Fascinating and frightening!

I will not want to bore you with an overload of information on the brain and its functions (interesting reading in *The Brain Book* by Rita Carter, 2019 see also: *Parts of Your Brain and Interesting Things They Do* by Frank Gallo, 2015).

However, a brief sketch of 'what sits where' may be helpful for understanding some of the concepts behind neuro economics, so join me on my amateur brain recy.

A simple, high level overview starts with a description of the different parts of the brain. These are in evolutionary order: The Brain Stem, the Cerebellum and the Cerebrum.



The *Brain Stem* is the lower part that connects the brain to the spinal cord. It is the oldest part of the brain and best described as the *engine room of the body*. It regulates breathing, heart rate and blood pressure, body temperature, etc.

Moving up both in literally and in evolution terms, the *Cerebellum* coordinates movement and balance. It is also the *processing centre* of finetuning thoughts and emotions and touch and other senses.

Top dog of the brain is the *Cerebrum*. While the brainstem and cerebellum can be found in all living creatures, only mammals and humans are 'blessed' with a developed cerebrum which in the human brain counts for 80 % of the total brain.

It controls the main functions such as vision, speech, thinking, problem solving, planning, organising, etc. And somewhere deep inside sits the Limbic Lobe with the Amygdala, which manages survival instincts and the brain's response to fear.

How the brain evolved.

It is fair to note that the brain as we know it was not always like this. Its evolution is traceable and recognisable in the various species on earth.

Charles Darwin taught us how the evolution of species is linked to changing environmental and inter-species threats. Tracing Darwin's footsteps teaches us that each further step on the evolutionary ladder has triggered another leap in development of the brain.

In the simple earthworm a primitive nerve system is formed by interconnecting a series of reactive fibres throughout the worm's body. In response to external stimuli, a coordinated muscle action in the worm's body made it move. The worm's brain directed this movement, and its function was lodged on top of the brainstem: the origin of a cerebellum. Fish and amphibians have a more elaborate cerebellum. This has a greater interconnectivity between nerves in their bodies telling them how to respond to sense and other signals and coordinates movement.

In reptiles, a larger forebrain developed which is home to more brain functions. This **Lizard Brain** introduces a first basic mechanism of decision making: it triggers the choice between *fight or flight* in response to external threats.

Through the evolutionary step by step from lizards to birds, to mammals, to humans, we see the growth of overlays developing into a separate upperpart of the brain: the cerebrum. In this cerebrum covered in thick layers of wrinkled cortex, we recognise the human brain of today.

The cerebrum is the clever part of the brain.

While it is dominant in humans, it does not make the other parts redundant.

The way the different parts of the brain influence behaviour is to a large extent impacted by circumstance. Thus, in some of our daily behaviour you may from time to time recognise some less rational and more instinctive brain reactions.

The Lizard Brain is never far away....

And why it responds the way it does.

For the study of neuro economics, the understanding of which external factors may stimulate certain type of reactions seems of paramount importance.

In *'The Brain'* David Eagleman explains how the brain dictates our behaviour with relatively little conscious rationalising by ourselves: " *...the conscious you is only the smallest part of the activity of your brain. Your actions, your beliefs and your biases are all driven by networks in your brain to which you have no conscious access.*"

We do many things on auto pilot.

Unconscious activity dominates our daily life.

Even our rational, conscious decision making is conditioned by circumstances, biases and social context.

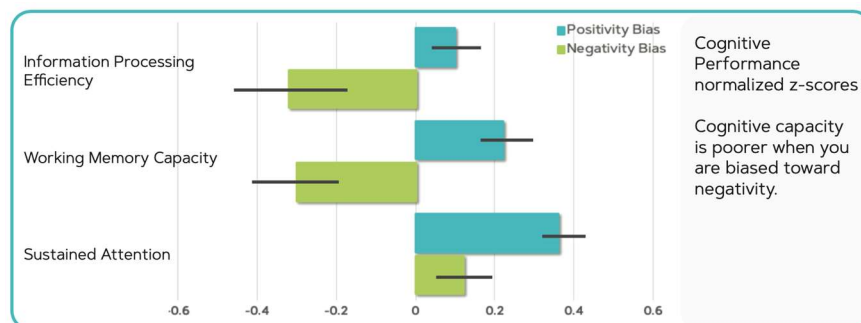
Let us look at a currently very relevant topic: how does the brain respond to uncertainty and fear? It is fair to say that the brain's organising principle is status quo. It likes 'safety first', so it warns us if things are different.

The brain sends out alerts if situations are different and unexpected and triggers a first impulse of uncertainty and fear.

The unconscious reaction is all about me and how to protect me.

This Lizard Brain response of 'fight or flight' is helpful for survival when being attacked. However, it may not work well when dealing with complex situations involving others.

This situation can be aggravated if others (the herd) share the feelings of threat and express this. Only with a positive bias to the recognition of the 'threat' and its origin, can we regain control by using the brain's information processing capacity, its working memory while staying alert and sustain attention.



Source: *Total Brain, How the Brain responds to uncertainty and fear, 2020*

The above chart illustrates the impact of positive or negative biases on brain activity (see: *Total Brain, a US based mental health consultancy and its publication How the Brain Responds to Uncertainty and Fear; Dealing with the impact of COVID-19 on your mental health, in 2020*).

Creating an environment in which a positive bias can develop, leads to focus, rational behaviour and improved decision-making capabilities. Sharing information and optionality in choices for problem solving support positive bias.

Hence an injection of neuro economics in current policy making might be just the ticket in today's public health cum socio-economic crisis.

3. Neuroeconomics; a brief summary

We feel that in periods of crisis, when uncertainty and fear and anxiety are rife, the Lizard Brain can be very dominant, even in the most rational human behaviour.

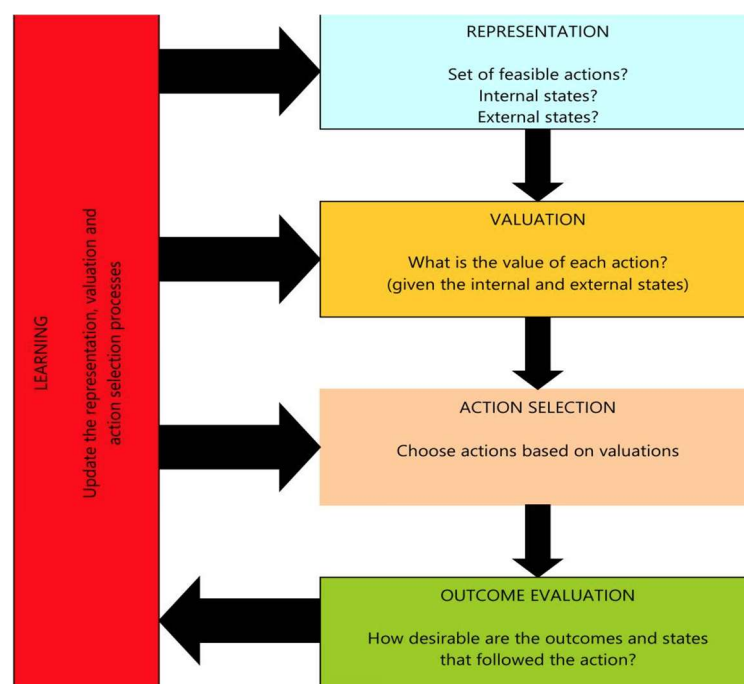
Instinctive responses to a problem do generally not contribute to effective decision-making.

If you ask a Lizard to plan for the future, you can expect very steep discount rates!

Neuroeconomics tries to integrate contributions from psychology providing data and process insights in behaviour under different circumstances. Adding neuroscientific knowledge of the brain and tools to study neural events during human decision making, will further enrich economic theory.

In a stage setting article in the *National Review of Neuroscience*, CalTech's neuroscientists Antonio Rangel, Colin Camerer and P. Read Montague present the case for neuro economics: *"Neuroeconomics is a relatively new discipline, which studies the computations that the brain makes in order to make value-based decisions, as well as the neural implementation of those computations. It seeks to build a biologically sound theory of how humans make decisions". (Neuroeconomics: the neurobiology of value-based decision making, June 2008).*

Rangel c.s. describe the process through which the Logical Brain breaks down the decision making in five basic steps in a *value-based decision making loop* which are a continuous loop through learning.



These different steps force brain activity to address the following:

- what is the problem and how do we solve it?
- what are the benefits of the different options?
- weighing the pros and cons and decide (selection).
- was the outcome satisfactory?
- constant feedback to improve future decision making (learning).

In progressing through these different steps, we ask the Logical Brain to work.

Yes, it takes effort and energy to work through the process.

To begin with, moving away from instinctive responses and going through the step-by-step approach as described above means that instant gratification (if any) is postponed. It means not following the herd but making up our own mind.

It demands that we check and re-check, re-visit old patterns and re-assess earlier choices. Such human decision-making demands willpower and energy, but the gratification will last longer.

With neuroscientific tools the efforts and computations made by the brain can be measured; brain activity can be followed.

Sharing all available data and valuation-information enhances confidence, allows the brain to function properly and reduce Lizard Brain responses.

Neuro economics is a new discipline and it requires a lot of further work. It will become a valuable contribution particularly on decision making in times of crisis.

As Rangel c.s. state: *"A better understanding of why people experience failures of self-control should lead to better public policy interventions in areas ranging from addiction, obesity to savings. Neuro economics might advance our understanding of how to train individuals to become better decisionmakers, especially in conditions of extreme time pressure and large stakes such as policing, war, and fast-paced financial markets."*

4. Albert Camus 'La Peste' revisited: the world under COVID-19.

'La Peste' (The Plague) is one of the best-known novels of the French Nobel Prize winner Albert Camus. His main character Dr Rieux is a doctor in the Algerian city of Oran when a plague epidemic occurs. He describes the people of Oran and life during lockdown.

Fear, uncertainty and stress trigger a pattern of unforeseen human behaviour which is shocking and frightening: anger, denial, escapism and deceit (fight or flight) are everywhere. People and their relationships break down and the mini cosmos of Oran is gradually destroyed. When the epidemic comes under control and life returns to normal, the world has changed forever.

With *La Peste*, Camus wrote undoubtedly one of the 20th century literary masterpieces.

Today's world under the COVID-19 pandemic bears many similarities with Camus' description of Oran in the 1940s. It is a nightmarish picture. People across the globe are living in fear of the virus and its potentially lethal impact on their personal health and that of family, friends and neighbours. It forces large groups of people to quarantine, to isolate and distance themselves from others. Loneliness is rife and patients are dying without their family and loved ones in their final hours.

For many people COVID-19 threatens their livelihood as a result of losing their job or reduced working hours. It creates havoc for businesses and devalues many properties and other assets.

Many children and adults suffer as a result of interruptions in their education and human capital is being destroyed.

The lack of social interaction depletes the way of life but also innovation and effective cooperation. A potential devastating long-term consequence of all is a growing undermining of the mental health of many.

Inequalities increase as the virus and the containment measures hit people in already disadvantaged situations harder as a result of a combination of factors, such as:

- poorer housing conditions, less outside space, multi-generational occupancy;
- work requiring physical attendance and less remote working possibilities;
- uncertain income prospects through fragile employment outlook and fewer job opportunities;
- weaker delivery mechanisms for health services and education (including access to IT equipment);
- reduced support networks, including through charities (faced with fund-raising draught).

There is also evidence that the pandemic and the public health measures have increased social tensions and created polarisation. The instinctive reaction of groups under threat is to identify a common enemy. It feeds an 'us and them' climate. Bipartisanism flourishes in this climate (the current US political situation seems offer plenty examples).

And the economic impact is....

Uncertainty and anxiety and fear do not create the best conditions for positive investment and consumer behaviour. Only the very brave (and the vultures) see opportunities and are willing to take high risks.

Most decisionmakers suffer from paralyzing delays and waiting for more information. While closing their minds, groups may start building walls and fortresses to protect their homes, but they are destroying society.

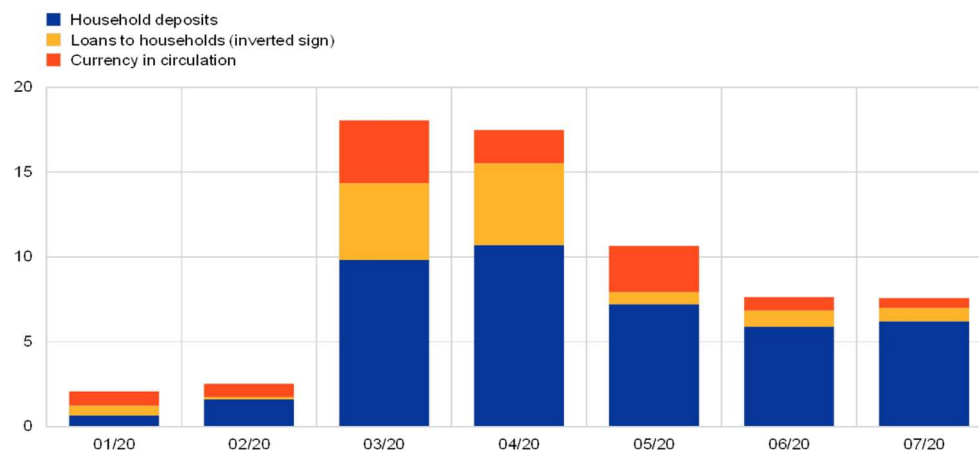
These are prime examples of the Lizard Brain "fight or flight" response.

It may well be explainable from a psychological/neuroscience perspective, but it is devastating from an economic point of view.

By way of illustration, when the New York Fed published its recent Household Spending Review, it reported on spending behaviour during the COVID-19 pandemic. It showed that the threat of reduced income from possible unemployment or reduced working hours, triggered spending cuts and, particularly the younger generations, increased indebtedness (see: Household Spending Review New York Fed September 2020). In Europe the picture is not very different as the graph below shows. Household savings jumped after the first lockdown measures as a result of reduced consumer spending and the hoarding of cash. (see ECB graph below).

Household deposits, loans and currency in circulation

(change with respect to December 2019, percentage points of disposable income)



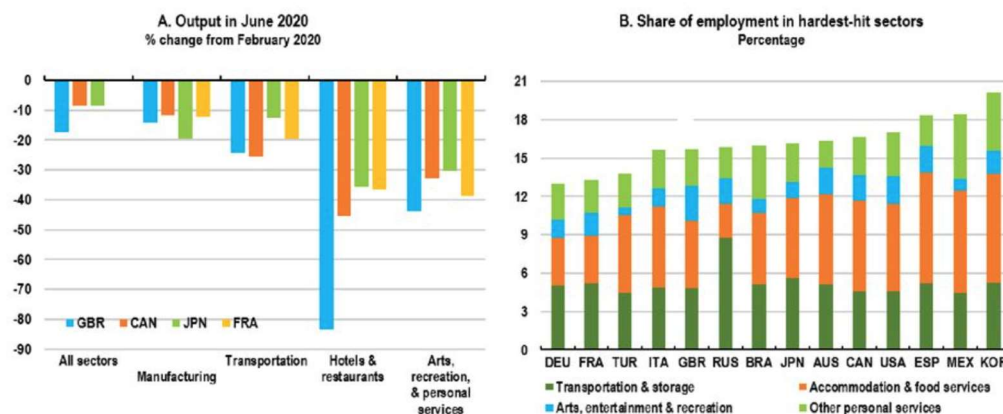
Sources: Eurostat and ECB.

Large government financial programmes for income support for people and businesses being hit by lockdown, have partly compensated for the reduced consumer spending but, as we have seen, GDP has suffered. The ongoing fear for personal health and work and business activity will not propel consumers to get back to the shops and spend.

Neuro economics will teach us that as long as the anxiety for the pandemic and its consequences continue to linger, business activity suffers in general and some sectors may face permanent damages in their future prospects.

The graph below from the OECD report on the impact of COVID 19 illustrates this frightening picture.

Figure 9. Jobs in the hardest-hit sectors represent a sizeable share of total employment

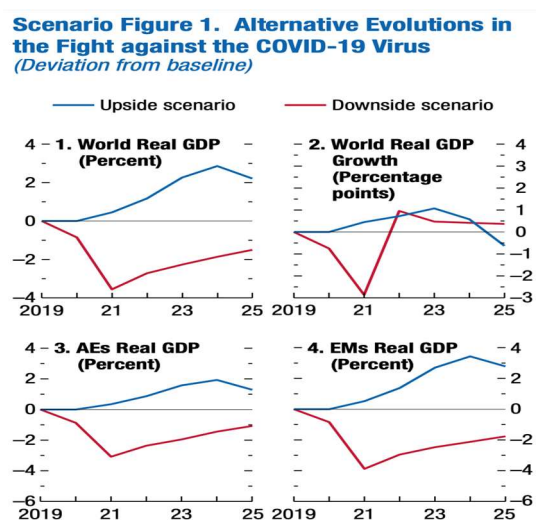


It shows that in sectors which were severely hit during by the lockdown, the future of employment is severely compromised.

It also highlights substantial geographical variations, showing that some countries are bound to suffer far worse than others.

In its World Economic Outlook of October, the IMF describes an upside and a frightening downside scenario. Under circumstances of repeated waves of COVID-19 infections in large parts of the world, a terrible damage will be done to the economies of world with another substantial drop in GDP in 2021.

It would bring about many years of shrinking economies. This would be particularly harsh for emerging economies, resulting in significant real GDP losses and hardly any recovery in the years till 2025. It will destroy the livelihoods of many (see graphs below).



Source: IMF World Economic Outlook Scenario Analysis October 2020

The continuing uncertainty for people's future will undoubtedly undermine confidence, and thus negatively impact consumer and producer behaviour and stall any hoped-for recovery.

Can neuro economics guide us to (re)build support and confidence in the future?

5. Policy making in uncertain times

How can we encourage the Logical Brain to guide the complex and difficult decision-making process on COVID-19 actions and not the Lizard Brain?

With the help of Andrea Alexander's study on '*Decision making in uncertain times*' (McKinsey, *Leadership in crisis: responding to the coronavirus outbreak and future challenges*, 24 March 2020), we can distil a few tips for action using the earlier described Rangel's 'value-based decision making loop'.

In assessing the various policy responses against Rangel's model approach, we can establish that many countries broadly followed similar policy approaches.

There are some idiosyncratic exceptions.

Sweden's policy approach of aiming for herd immunity and light touch public health measures, was different from all other European countries. However, they followed the rule book of the Logical Brain and found sufficient consensus and public support to stick to these policy objectives. It will take a long time to assess the validity of their policy approach.

The approach followed by the Federal Governments of the US and Brazil was different and erratic. It cannot be seen as aligned with Rangel's loop. The main policy decision-making steps were tainted by denial and escapism, blaming others and even deceit. These are dominant features of the Lizard Brain approach (with apologies to the President who calls himself a 'genius').

Building on neuro economics insights, the following could be distilled:

- For all the side effects that the lockdowns and other measures have, we should not lose sight of the fact that COVID-19 is a pandemic creating a **public health crisis**. Communicating as many governments did, that they needed to balance public health and the economy is confusing the issue. Yes of course, negative effects of lockdown measures need to be mitigated, but the crisis remains a public health crisis first and foremost. Without solving the health crisis there is never going to be a sound economic recovery. So, clarity of purpose is demand Number One!
- **Transparency on the potential impact** of the different plans of action is essential for public confidence. Impact analysis needs to provide information of positive and negative consequences for the short and longer term. It also needs to be made clear as far as possible, what the impact is for different categories of the population. The latter is of vital important to avoid creating new grounds for polarisation and pitting groups against each other.
- Provide a clear as possible **path forward**, through the crisis and sketch the intended longer-term horizon. Use input from science and encourage public debate before selecting a course of action at political level. Building a **consensus based transformative policy agenda** addressing issues of growing gaps in come, between business sectors and between advanced and developing/emerging economies. Such agenda could strengthen positive biases which facilitate rational economic decision making.
- It needs however to be clear from the outset that there is no perfect solution and that circumstances may force to change action. Explain the willingness to keep an open eye/ear and be ready to **adapt, amend or change**. Much attention needs to be devoted to collecting data after the implementation. Sharing those is vital for the ongoing public support and confidence. Completing the feedback loop with **lessons learnt** ensures better decision making in the future.

- Encourage **rebuilding social networks** savaged by the quarantines and lockdowns through actively supporting dialogue and contacts. This is very important to avoid the polarising effects to become ingrained in society and the political sphere.

The value of tomorrow's promise is not very high if survival is the primary objective (the world of the Lizard).

We need the Logical Brain to help us through the pandemic.

Neuro economics can help to ensure that it gets the space to act.

Bart Le Blanc, 31 October 2020.

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