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Bejakovic, P., Druzeta, R.P., Skare, M. (2021), "Intricate, Unreliable and Ungrateful Estimations on the Impact of the Coronavirus on Economic Development", *Transformations in Business & Economics*, Vol. 20, No 2 (53), pp.21-40.

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**BUSINESS & ECONOMICS**

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## **INTRICATE, UNRELIABLE AND UNGRATEFUL ESTIMATIONS ON THE IMPACT OF THE CORONAVIRUS ON ECONOMIC DEVELOPMENT**

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*Received: 3 October, 2020  
1<sup>st</sup> Revision: 23 October, 2020  
2<sup>nd</sup> Revision: 29 October, 2020  
Accepted: November, 2020*

***ABSTRACT. Research background: The situation with the spread of the coronavirus is very serious and could even get worse. This negatively impacts the population as well as the economy on the global and national level.***

*Aim of the article: The aim of the article is to explain the complexities regarding the evaluation of COVID-19 impact on health and economy as well as to analyse some realised measures. Despite great technological progress and expansion, the science of epidemiology, responses to epidemics of the twenty-first century demonstrate that the world is not adequately prepared to lessen the impact of an emerging threat or prevent its appearance leaving mankind vulnerable to adverse consequences.*

*Methods: The impact of pandemics is so vast and uncommon as it affects all elements of demand and supply. To study the pandemic impact in Croatia we use Hamilton (2018), Stock and Watson (1999) one-sided HP filter.*

*Findings & Value added: The most vulnerable sectors are all forms of transport, travel and hospitality, as well as all forms of entertainment. Usual economic measures, like tax cuts and stimulus spending, will not restore cancelled events, revive ruined supply chains or encourage suspicious consumers to go spending. Needed measures incorporate coordinated multilateral actions to ensure effective health policies, containment and mitigation activities, support low-income citizens, and jointly raise fiscal spending. Mentioned measures would be the most effective means of restoring confidence and supporting incomes.*

**KEYWORDS:** COVID-19, 2020 health crisis, economic consequences, pandemic and recession curve, public health, recovery.

**JEL classification:** I1, C33, F44.

## Introduction

In the second half of August 2020, it looks quite obvious that the situation with the spread of the coronavirus is very serious and could even get worse. This affects all local and world population as well as the economy on the global and national level. Quantifying the economic impact is a complex and unenviable task, giving rise to significant uncertainty about the economic consequences and the related downside risks. Such an unexpected rise in uncertainty can put both economic growth and financial stability at peril (Adrian, 2020). Let begin with what we know and what we yet do not know about the coronavirus. The next issue is how the global and national economy and community would be influenced and can support those most affected by this crisis in a coordinated and effective way. Briefly, governments and policymakers cannot prevent economic damage from the outbreak, nevertheless, they can limit it and make a quick rebound more possible (Casselmann, 2020).

The goal of the article is to explain the complexities regarding the evaluation of COVID-19 impact on health and economy as well as to analyse some realised measures. After this short instruction, follows the section dedicated to available information on COVID-19. Section 3 addresses unknown facts related to COVID-19, while Section 4 analyses measures at the global level and describes more vulnerable economic sectors. While there is an abundance of articles regarding national activities from large countries containing COVID-19, there is a lack of reviews from small countries like Croatia. Therefore, Section 5 addresses the consequences of the COVID-19 on the Croatian economy and provides a short overview of realised measures. Before conclusion, there is a section dedicated to the possibility of

lessening the adverse consequences of pandemic titled Flattening the Pandemic and Recession Curve-Trade-off.

## **1. What we Know About the Consequences of COVID-19. Literature Review**

The current outbreak of coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), continues to spread around the world. At the time of writing this paper (17 August 2020), according to data by the World Health Organization (2020), there are more than 21 million confirmed cases of COVID-19 worldwide. So far the total number of deaths is 761 thousand, while many people have fully recovered and are considered healthy. According to the same source, in Croatia, the number of confirmed COVID-19 cases is 6,258 with 163 deaths.

There are millions of types of viruses in the environment, among these human coronaviruses (HCoVs) are common in humans causing around 30% of cases of the common cold. Breitbart, Rohwer (2005) deem that the viral diversity of viruses could be high on a local scale but relatively limited globally. Furthermore, by moving between environments, viruses can facilitate horizontal gene transfer. Coronaviruses were first discovered in 1968 (Mahy, 1980; Mesel-Lemoine *et al.*, 2012) and named so due to their crown-like bulbous appearance (in Latin “corona” means crown) in electron micrographs. As the outbreak is continuing to evolve, many scientific research activities have been conducted to better understanding the origin, functions, treatments, and preventions of this novel coronavirus (Acter *et al.*, 2020, Ye, *et al.*, 2020).

Although there are similarities between SARS and COVID-19, the variances will determine which lessons could apply to COVID-19. COVID-19 differs from SARS in terms of the infectious period, transmissibility, clinical severity, extent of community spread (Wilder-Smith, Chiew, Lee 2020; Primorac, 2020). SARS was successfully eradicated by implementing top-down draconic measures to halt all human-to-human transmission. Traditional public health measures used during SARS were efficacious and included active case detection, isolation of cases, contact tracing and quarantine of all contacts, social distancing, and community quarantine. Whether these activities will be successful for COVID-19 will not depend on the similarities between SARS and COVID-19 but on the differences between them (Wilder-Smith, Chiew, Lee, 2020).

Novel coronavirus COVID-19 reminds us that although the focus especially in high-income countries turned to non-communicable disease, which constituted a considerable and increasing burden of disease of their citizens, the infectious disease did not disappear (Bedford *et al.*, 2019). Despite great technological progress and development of the science of epidemiology, responses to SARS, MERS, Ebola, Zika and other epidemics of the twenty-first century demonstrate that the world is not prepared to mitigate the impact of an emerging threat or prevent its appearance leaving mankind vulnerable to their consequences (see *Table I*). Current demographic trends characterised by population growth, rapid urbanisation, strong globalisation, inappropriate farming, climate change and political instability have fundamental effects of infectious diseases that are almost impossible to predict (Bedford *et al.*, 2019). Furthermore, the pandemic stresses the intricate relationship between people, animals and the environment which means that the entire framework of the response to epidemics has to be adopted.

**Table 1. Epidemics of the twenty-first century**

Disease	Organism	Reported year	Number of people affected	Number of deaths
SARS-CoV	Coronavirus	2002–2003	8,098	778
Zimbabwean cholera	<i>Vibrio cholerae</i>	2008	8,500	4369
Flu	H1N1 Influenza A	2009		18,000
West African meningitis	<i>Neisseria meningitidis</i>	2009	13,516	931
Haitian cholera	<i>Vibrio cholerae</i>	2010	80,000	9,985
Dengue fever outbreak	Dengue viruses	2011	21,204	<300
MERS	Coronavirus	2012	2,494	858
Ebola	Ebola virus	2013	28,600	11,325
Zika	Zika virus	2013-2014	Approx. 2,400	29 babies in Brazil (2015)
Yemen cholera	<i>Vibrio cholerae</i>	2016	269,608	1,614
Nipah	Nipah virus	2018	19	17
COVID-19	SARS-Cov2	2019-2020	Until 16 August, 2020, over 21 million confirmed cases	Until 16 August, 2020, 761 thousand deaths with significant reporting.

Source: Srivastava, Baxi, Ratho and Saxena, 2020. For Covid-19, WHO (2020).

We know that this shock is fully uncommon as it affects important elements of both supply and demand side. Supply will be disordered due to morbidity and mortality but also from a direct reduction in the supply of labour from unwell workers and the restraint efforts that limit mobility and higher costs of doing business due to controlled supply chains and a tightening of credit. One should not neglect the reduced labour supply from caregivers who have to take care of kids because of school closures. Furthermore, an even larger effect on economic activity happens because of efforts to hold the spread of the disease through lockdowns and quarantines, which inevitably lead to a drop in capacity utilisation. In addition, firms that rely on supply chains may be unable to get the parts they need, neither domestically nor internationally (Gopinath, 2020). Demand will also decrease due to a higher level of uncertainty, increased precautionary behaviour, containment efforts, and increased financial costs that reduce the ability to spend. These effects will spill over across borders. Georgieva (2000) deems that under any scenario, global growth in 2020 will drop significantly below last year's level. How far it will decrease, and for how long, it is difficult or probably impossible to predict, and would depend on the epidemic itself but also on the timeliness and effectiveness of organised human actions.

Experience suggests that around one-third of the economic losses from the pandemic disease will be related to direct costs, primarily from loss of life, workplace closures, and quarantines. The remaining two-thirds will be indirect costs, reflecting a decrease in consumer confidence and business behaviour and a tightening in financial markets. The first adverse consequences were quite obvious on the financial market (Westbrook, Murdoch, 2020). Stock markets in major economies, such as the United States, the Euro area, and Japan, all fell sharply and witnessed an outpouring in implied volatility as nervous investors tried to lessen the latest risks posed by the uncertainty related to coronavirus. Without a doubt, investors are reallocating (and will do it even more in the nearly future) from relatively risky to safer assets. Particularly hit hard by these reallocations are emerging-market and previously high-yield

bonds. As a consequence, the spreads of emerging- and frontier-market bonds denominated in U.S. dollars have sharply widened (Adrian, 2020).

The most vulnerable sectors are all forms of transport and travel, particularly air companies, cruise lines, hotels and restaurants as well as all forms of entertainment with a huge number of visitors, like sport and cultural events. They all got into a difficult situation during pandemic outbreaks due to travel bans and warnings, and general uncertainties – real or imagined – about infection (Kirby, 2020). The disease also negatively influenced supply chains because many closed factories, particularly in China, making components unavailable to other parts of production, drained sales of some products, deeply scared the stock markets and intensified fears of a global recession. Current problems maybe are less serious for producers of durable goods, but without a doubt will cause a hard time for hotels and restaurants in their attempts to cover up the lost revenues (Yglesias, 2000). The situation differs from one country to another. For Austria for example, Economy Minister Ms Margarete Schramböck estimates that 70 to 80 per cent of companies in Austria have partially lost their business basis (ORF.at, 2020).

With sales of various goods on the decline due to the pandemic, manufacturers reduced production and fired workers. The decline in the construction of houses also causes surpluses of the labour force and layoffs. Workers that lost jobs reduced their spending and even employed people started to spend less. Fewer travelling means fewer people in harbours, airports and in hotels. Fewer people in such premises means reduced working hours and fewer tips for people who provide various forms of services or work in retail. If the typical worker were having significant savings on his or her bank account, they could dismiss the hit to their income as temporary. However, it is well known that most working-class people, even in a very rich country like Great Britain and the United States, mostly live from one monthly salary to another. Due to mentioned liquidity constrained, in a case of lower salary or possible unemployment, due to current economic situation they could find themselves in a very dire position unless they have money coming in. Finally, the slower economic activity causes the harder collection of necessary money for state and local budgets; and therefore central state and governments on various levels reduce spending.

The coronavirus epidemic has definitely exposed vulnerabilities for many companies in the world, particularly those that rely heavily on China for their supply chains and production. These companies may be forced to cut some of their dependence on China, a process that has already started because of the trade war by President Donald Trump. They will not abandon China altogether, but rather distributing or diversifying supply chains to better protect against major crises that dramatically impact one country or one region more than others.

The possible positive news is that financial systems are probably more resilient than before the Global Financial Crisis. However, the biggest challenge right now is how to handle uncertainty. This is particularly difficult for countries with underdeveloped or weaker health systems and response capacity. Therefore, there is a need for a global coordination mechanism to reduce uncertainty and accelerate the recovery of demand and supply. The COVID-19 outbreak leads to a crisis with considerable losses in terms of health but also of the global economy with a serious social cost (Hynes *et al.*, 2020). Currently, the evolution of the disease has disrupted the economy and high uncertainty about the virus, including its origin, extent, duration of transmission in humans, ability to infect other animal hosts etc., makes it difficult for policymakers to formulate an appropriate measure and policy response (McKibbin, Roshen, 2020a). At the same time, they are confronted with an increasing burden of multiple public health emergencies and resolving public health problems, economic costs

of mitigation measures, division of authority and responsibility in society and danger of social unrest.

Since humanity's destruction of biodiversity creates new conditions for new viruses and diseases such as COVID-19, every society has to choose what priority to give to social development. Such choices should reflect the values of a particular society, as the COVID-19 is obviously no longer a regional issue but a global problem that requires a global response. McKibbin, Roshen (2020a) deem that the possible costs that can be avoided through global cooperative investment in public health in all countries. This critical policy intervention has been well known for a long period, yet decision-makers continue to ignore the scientific evidence on the role of public health in improving the quality of life and as a driver of economic growth. According to the Public Affairs Committee of the Biophysical Society (2020) effectively containing and limiting the spread of future viruses, such as COVID-19, heavily depend on investment in fundamental biomedical research. This is the best tool in eliminating COVID-19 entirely, preventing future pandemics and ravaging societies and economies.

## 2. Data and Methods

Two different approaches (for results robustness) are applied to the analysis of overall (direct + indirect) effects on the economy during an epidemic crisis. In the time of disease crisis, we calculate direct effect as a complete loss of tourist arrivals and tourism spending (from data of the UNWTO). We use a Hodrick, Prescott (1997), Stock, Watson (1999) and Hamilton (2018) approach to measure the indirect consequences of travel restrictions and terrorist acts and decreases in outbound expenditure and changes in socio-economic and environmental conditions worldwide.

Due to a disadvantage in a Hodrick, Prescott filter (1997) (HP)-spurious dynamic data generation relationships, sample end, smoothing parameter selection, diminishing operation of values to be used. Stock, Watson (1999) one-sided (HP) filter removes some of the issues in the two-sided (HP) filter. The filter we use

$$\begin{aligned} y_t &= \tau_t + \varepsilon_t, \\ (1-L)^2 \tau_t &= \eta_t \end{aligned} \quad (1)$$

where

$y_t$  = data series in the logarithm form,

$\tau_t$  = unobserved trend component with  $\varepsilon_t$ ,

$\eta_t$  as white noise sequences (uncorrelated).

For the annual ( $h=4$ ) data Hamilton (2018) uses non-stationary data from time series (the number of tourist entries and expenditures, GDP) that fit OLS regressions, using  $y_t + h$ . The stationary and cyclical components of the sequence are separated from derived residuals (stoppable prediction of expected errors). Hamilton filter (2018) follows:

$$\begin{aligned} y_{t+h} &= \beta_0 + \beta_1 y_t + \beta_2 y_{t-1} + \beta_3 y_{t-2} + \beta_4 y_{t-3} + v_{t+h} \\ \hat{v}_{t+h} &= y_{t+h} - \hat{\beta}_0 - \hat{\beta}_1 y_t - \hat{\beta}_2 y_{t-1} - \hat{\beta}_3 y_{t-2} - \hat{\beta}_4 y_{t-3}. \end{aligned} \quad (2)$$

## 3. What We do not Know About the Coronavirus

There is still so much that is unknown about the coronavirus disease, which makes the potential economic consequences for the whole world extremely uncertain. It is also known that the coronavirus will eventually retreat, but it is unknown how fast this will happen. It is

unknown how the disease is contagious, and the exact role that children – who seemingly may be less affected by it – may play in transmission. Moreover, it is questionable if the outbreak will naturally slow down when the weather warms, as tends to happen with influenza. The coronavirus could prove to be deadlier than it currently is; the fatality rate is around 2 per cent, but that could change. It could also prove to be the opposite if more people are found to have mild cases. Available correlation analysis between disease severity and inflammation-related parameters in patients with COVID-19 pneumonia are relatively still rare (Gong *et al.*, 2020).

Additionally, in the economic analysis it is difficult to completely isolate one factor – in this case, a coronavirus pandemic – from everything else happening in the global world and/or national state that can push markets into the troubles or stress economies. Therefore, it is obviously hard to predict how deep, lasting, or widespread any economic fallout will be. Currently, investors do not know for sure if and when a global slowdown is going to happen. In any case, they are preparing as if it will and they are reacting to fears now.

#### **4. How to Respond at the Global and Country Level**

Georgieva (2000) underlines that the first priority in terms of fiscal response is to guarantee efficient front-line health-related spending. This includes slowing down the spread of the virus, take care of the sick and protecting people's wellbeing. Crucial are health-related actions, primarily to ensure the adequate production of medical supplies so that supply can satisfy increased demand. Second, macro-financial policy measures may be required to solve the supply and demand shocks. The aim of such measures should be to lessen and shorten the adverse economic impact. Such measures should be timely adjusted and targeted to the sectors, businesses, and households that are most vulnerable and suffer most from the consequences of the disease. A generalised decrease in demand through confidence and spill-over channels (including trade, tourism and hospitality, commodity prices, and tighter financial conditions) would require an additional policy response to support demand and assure a suitable supply of credit. Third, tolerable liquidity will also be needed to counterbalance financial stability risks.

The tools that economic policymakers usually apply, like tax cuts and stimulus spending, will not restore cancelled events and conferences, revive ruined supply chains or persuade suspicious consumers to go out to restaurants and hotels. Even if such policies would probably help, they conflict with the guidance of responsible health institutions who are reasonably demanding isolation or “social distancing” to slow the spread of the virus.

The sharp tightening in financial conditions, along with expectations of low inflation, means that monetary policy has a role to play in the current crisis. Central banks can act quickly to help ease the tightening of financial conditions by injecting liquidity and cutting interest rates, thus preventing a possible credit crunch. For example, the USA Federal Reserve has already cut interest rates. Kirby (2020) reminds that markets have been anticipating aggressive easing by central banks, as reflected in the sharp fall in sovereign bond yields in many countries around the world. Different countries propose various aid programmes for the economy. Central banks should provide sufficient liquidity to banks and non-bank finance companies, mostly to those lending to small and medium-sized enterprises, which may be less prepared to withstand a sharp disruption. Governments could offer temporary and targeted credit guarantees for the near-term liquidity needs of these firms. The Austrian government prepares a new aid package worth € 4 billion (ORF.at, 2020). Korea has extended lending for

business operations and loan guarantees for vulnerable small and medium-sized enterprises (Gopinath, 2020).

Briefly, the situation is changing rapidly and there is an obvious need to provide a more forceful and coordinated response adequate to the unfavourable conditions. It is necessary to praise the statements and decisions from the various bodies and international institutions that are ready to cooperate further on timely and effective measures. Effective international cooperation is particularly important for small countries, like Croatia.

## **5. The Consequences of the Coronavirus on the Small Economy: Results from Croatia**

Croatia is a small country located in South-East Europe, highly dependable on tourism, which represents around 18–20% of its GDP. Therefore, the consequences of the coronavirus on the Croatian economy should be seen primarily through this economic sector and its spill-over effects on the whole economy. As the share of exports in Croatia's GDP, primarily due to positive trends in tourism, has increased over the last 10 years, so its GDP has become increasingly sensitive to changes in exports. Such export-driven growth led to the changed structure of the economy. A higher share of exports means that such growth can have a greater impact on total economic development. Of course, negative factors, as a sudden decrease in exports, due to an exogenous event like coronavirus, could very fast result in a significant GDP decline (otvoreno.hr, 2020). Tourism is very sensitive to safety and health because if tourists do not feel safe, they do not travel. The expert for tourism, Marina Tkalec explains that due to the nature of Croatian tourism where the majority of the guests are coming by private booking with personal cars during the summer season in June and August, it is possible to achieve relatively decent results if the pandemic will last one month. However, if it will last for two months or more, there could be really harmful consequences for Croatian tourism and the economy in total (Klancir, 2020).

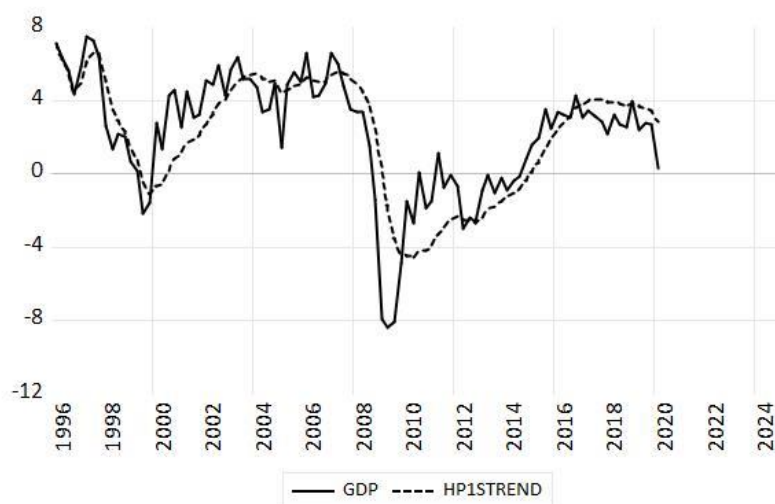
The concerning coronavirus situation has contributed to another serious economic problem in Croatia. In such circumstances, the Croatian government has decided to give up the search for a strategic partner for national air-carrier Croatia Airlines that is in an unfavourable financial situation. According to the Ministry of Maritime Affairs, Transport and Infrastructure, following the meeting of the Commission for the implementation of the procedure and proposing the selection of the strategic partner of Croatia Airlines, the current course of action of finding a strategic partner was discussed. The Commission decided, due to the unfavourable situation and the risks present in the air-transport sector, to adjust the dynamics of the whole process. Therefore, the process will be put to rest, in accordance with the deadlines set by the government's decision on creating the pre-requisite conditions for securing the process of recapitalisation of Croatia Airlines (Bicak, 2020).

Over 1,300 cultural workers, most of whom are freelancers or independent authors in creative industries have signed on 15 March 2020 an appeal for urgent assistance which they need to overcome the current situation caused by the outbreak of coronavirus. Concerts and other cultural events are recurrently being cancelled or postponed due to the outbreak of the disease. Such a situation affects creative industries, notably freelancers and precariously employed professionals in that sector. The signatories also warn that although the situation concerning public health can go back to normal until the end of April, the crisis in this cultural sector is likely to last until Autumn 2020 (Barbarić, 2020). The Ministry of Culture has already promised the government's measures to prop up businesses which also include assistance for artists and creative industries to pass through this period as less painfully as possible (Ministarstvo culture, 2020).



The Croatian National Bank (CNB) on 13 March 2020 stated that the growth of the Croatian GDP would probably deviate from the initial forecasts to a considerable degree due to the outbreak of coronavirus. Therefore, the bank will take measures to help the economy to overcome the situation. One of the measures which the CNB is going to conduct is a structural operation for five years at the interest rate of 0.25%, and this will be carried out on 16 March. In addition, the CNB has started buying state bonds with the goal of maintaining stability on the market of state securities (The Croatian National Bank, 2020).

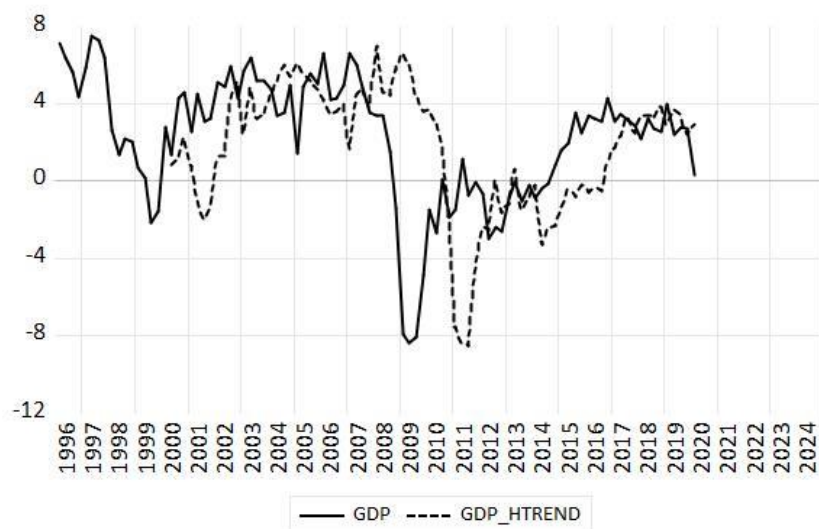
*Figure 1* shows the estimated trend component and actual GDP data for Croatia for 1996–2020. We can see estimated GDP trend follows actual data well (taking into account the high level of output volatility in the Croatian economy). Small, open economies, highly dependent on tourism as Croatia, is highly sensitive to external shocks. The crisis of 2008 as we see from the figure resulted in an output drop of -8.5% in 2009. Compared to the trend estimate we can see that external shocks (large events) in Croatia on average cause a drop in the GDP by 8–9%. Therefore, we can estimate the COVID-19 on Croatia to be -9% GDP drop in 2020.



*Source:* authors' estimation.

*Figure 1. Covid19 Impact Estimation on Croatian GDP using One-sided HP Filter*

The results of the Hamilton (2018) filter differs from the results of the Stock & Watson (1999) one-sided (HP) filter (see *Figure 2*). We can see that the estimated impact on output in Croatia of large events (exogenous shocks as a crisis of 2008 or pandemic 2020) on average is 12.4 to 14.4% GDP drop. We can expect GDP in Croatia to fall according to our estimates around 13.9% in 2020.



Source: authors' estimation.

Figure 2. COVID-19 Impact Estimation on Croatian GDP using Hamilton Filter

Our results show that external shocks (large events) have a large, significant negative effect on output in Croatia. The total extent of the impact depends on the country openness, economy structure, dependence on the tourism industry, level of private and public debt, government response to a crisis. Econometric filters for sure cannot account for uncertainty and bias associate with COVID-19 or other large external events but provide a valid starting point in assessing the event's effect on the economy.

## 6. Flattening the Pandemic and Recession Curve-Trade-off: Discussion

While much remains unclear about the precise characteristics and dynamics of coronavirus there is little doubt about the human costs of the coronavirus outbreak or its impact on overwhelmed hospitals and the economic consequences of the pandemic. Isolation was having a deep impact beyond the virus, causes huge hidden costs (including mental wellbeing), which would influence when and how to reopen the economy and how to return to normality (Payne, 2020). Efforts to flatten the epidemic curve inevitably have significant economic consequences and thus raise many questions: What is the price that societies attribute to the value of life? How will country-based mitigation measures influence the course of the COVID-19 epidemic? How to balance the management of the global health care crisis and the consequent financial crisis? Whether the world will give greater priority to investing in the prevention of future pandemics? The general lack of understanding of this new virus led to confusion and mixed advice from professionals and authorities (Bruinen de Bruin *et al.*, 2020). This unavoidable trade-off between health and economic development requires greater attention. A more comprehensive description and a brief summary of various studies can be found in *Table 2A (Appendix 1)*.

Over a short period, an extensive literature has been developed (Manderson, Levine, 2020, Setti *et al.* (2020), but still high uncertainty about the virus makes it difficult to find an appropriate measure and an adequate policy response. The epidemiology literature concludes that early public health interventions lower peak mortality rates – flattening the curve – and

reduce cumulative mortality rates (Markel *et al.*, 2007; Bootsmaa *et al.*, 2007). As pandemics are highly disruptive to the local economy, these efforts can mitigate the abrupt disturbances to economic activity that result from such shocks (Correia, Luck, Verner, 2020a). Even if traditional public health measures are not able to fully contain the outbreak of COVID-19, they are effective in reducing peak incidence and global deaths (Wilder-Smith *et al.*, 2020). As a result, the rapid implementation of non-pharmaceutical interventions (NPIs), like social distancing can be useful to strengthen the effects of more traditional economic policy interventions (Gourinchas 2020).

OECD (2020a) estimates that the early direct impact of the shutdowns could be a decline in the level of output of between one-fifth to one-quarter in many economies, with consumer expenditure potentially dropping by around one-third. This is far greater than anything recorded during the financial crisis from 2008. And this assessment only incorporates the initial direct impact in the sectors involved and does not consider any additional indirect impacts. Therefore, governments need to act swiftly and forcefully to overcome the coronavirus and its economic impact. Supportive macroeconomic policies and measures can be useful to restore confidence and aid the recovery of demand, however, cannot counterbalance the immediate disruptions that are consequences of enforced shutdowns and travel restrictions. Needed measures encompass coordinated multilateral actions to ensure effective health policies, containment and mitigation activities, support low-income citizens, and jointly raise fiscal spending, which would be the most effective means of restoring confidence and supporting incomes. Hynes *et al.* (2020) underline the importance of adequate funding which should be prioritised according to immediate needs for economic recovery considering local demand and regional and global supply chain for regional, national, and global economy. A rational response to the pandemic with an interdisciplinary approach and solidarity is needed. McKee, Stuckler (2020) pointed out that the COVID-19 pandemic could be a turning point, restoring faith in science and bringing people together. However, this will happen only if the voices of scientists and healthcare professionals are heard.

Any hope of constructing an intelligent plan in a short period requires collaboration between public health experts and economic professionals. Just as a pandemic would be a disaster for the economy, a sharp economic downturn would be catastrophic for the public's health. The goals of epidemiologists and economists are therefore fundamentally aligned. Efforts to flattening the epidemic curve inevitably have significant economic consequences and it raises the questions: What is the price that societies attribute to the value of life? How to balance the management of the global health care crisis and the consequent financial crisis? Whether the world will give greater priority to investing in the prevention of future pandemics? Reducing economic activity will reduce the overall size of the economy, but GDP is not only a measure of social wellbeing (Marron, 2020).

## **Conclusions**

Due to the coronavirus, layoffs for business-related reasons have been recorded in many countries including Croatia. Unemployed persons can apply at the Employment Offices for unemployment benefits if they fulfil the defined criteria. Some facilities have been voluntarily closed, others will be closed, and it is most obvious that new mandatory closure orders will come. The Croatian government has decided to postpone the payment of taxes and contributions, however, the forecasts for tourism and hospitality, transport and many other services were very negative. Tourist season was much better than expected, but with unknown

consequences for the spreading of COVID-19. Investments are under the question mark because no one knows how long it will take to fight the coronavirus. In any case, this is a state of emergency very similar to the state of war, and in recent history, there has been no such a serious economic and health crisis.

What are the experiences and lessons from the previous crisis? Every country is specific and it is almost impossible to prescribe recipes for all. For Croatia, as a small and open economy, there is an obvious need to reduce public expenditures and relieve tax and particularly parafiscal levies on entrepreneurs. Delaying payment of taxes and contributions is a desirable measure even though no one has defined how long it will take and how it will be repaid (either at once or in instalments). These budget revenues will be lacking for pensions and healthcare expenditures, which means that the public debt will probably increase. Simultaneously, as open unemployment will rise, many families will be financially vulnerable and exposed to poverty. Therefore expenditures for unemployment benefits and social welfare rights will strongly grow. In nearly future, decision-makers in Croatia should solve a very complex issue: how to improve the efficiency in various policies – primarily in healthcare, education, public investment – in the conditions of limited possibilities for public spending rises and increase population demands for various forms of public protection.

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**PAINUS, ABEJOTINAS IR NENAUDINGAS KORONAVIRUSO POVEIKIO EKONOMIKOS PLÉTRAI VERTINIMAS****Predrag Bejaković, Romina Pržiklas Družeta, Marinko Škare****SANTRAUKA**

Koronaviruso plitimo situacija yra itin rimta ir gali net pablogėti. Ši situacija neigiamai veikia gyventojus bei ekonomiką pasauliniu ir valstybiniu lygmenimis. Šio straipsnio tikslas yra paaiškinti COVID-19 poveikio sveikatai ir ekonomikai vertinimo sudėtingumą bei išanalizuoti kai kurias įgyvendintas priemones. Nepaisant didelės technologinės pažangos ir plėtos bei epidemiologijos mokslo tyrimų, reakcija į XXI amžiaus epidemijas rodo, kad pasaulis nėra tinkamai pasirengęs sumažinti kylančios grėsmės poveikį arba užkirsti kelią jai atsirasti; taip žmonija lieka neapsaugota nuo neigiamų grėsmės padarinių.

Pandemijų poveikis yra toks stiprus ir skirtingas dėl daromos įtakos pasiūlai ir paklausai. Siekiant iširti pandemijos poveikį Kroatijoje, taikytas Hamilton (2018), Stock ir Watson (1999) vienpusis Hodriko ir Preskoto filtro metodas. Nustatyta, kad tarp labiausiai pažeidžiamų sektorių patenka visos transporto, kelionių ir apgyvendinimo formos, taip pat visų rūšių pramogos. Įprastos ekonominės priemonės, tokios kaip mokesčių mažinimas ir išlaidų skatinimas nesugrąžins atšauktų renginių, neatgaivins sutrikusių tiekimo grandinių bei nepaskatins nepatiklių vartotojų išleisti daugiau pinigų. Būtinai priemonės sudaro bendri daugiašaliai veiksmai, kuriais siekiama užtikrinti veiksmingą sveikatos priežiūros politiką ir tikslingas suvaržymo bei švelninimo priemones, paremti mažas pajamas gaunančius piliečius ir drauge padidinti fiskalines išlaidas. Šios priemonės yra pačios veiksmingiausios, siekiant susigrąžinti pasitikėjimą ir suteikti materialinę paramą.

*REIKŠMINIAI ŽODŽIAI:* COVID-19, 2020 m. sveikatos krizė, ekonominės pasekmės, pandemijos ir nuosmukio kreivė, visuomenės sveikata, gerėjimas.



## Appendix 1

Table 2A. Summary of studies

Study	Objective/Settings	Main Findings
Hollingsworth <i>et al.</i> (2011)	Using epidemiological models of influenza A to investigate how contact-reducing interventions and availability of antiviral drugs or pre-pandemic vaccines contribute to achieving particular policy objectives. Furthermore, to demonstrate the importance of tailoring pandemic plans to defined policy targets with some flexibility to allow for uncertainty in the features of the pandemics.	The analyses show that the ideal strategy depends on the aim of an intervention and that the achievement of one policy objective may impede success with others. Constraining total case numbers can be accomplished by a range of strategies, whereas strategies that additionally constrain peak demand for services require a more sophisticated intervention. Interventions can reduce the impact of an outbreak and buy time until vaccines are developed but they may have a high social and economic cost. Choices must be made about priorities. The earlier a long term intervention is realised and the more effective it is at reducing transmission, the greater the beneficial effect in terms of total epidemic size and peak prevalence.
Kissler <i>et al.</i> (2020)	The paper identifies viral, environmental, immunologic factors which in combination will determine the dynamics of SARS-CoV-2.	The potentially catastrophic burden of the healthcare system is predicted if distancing is poorly effective and/or not sustained for long enough. Additional interventions, including expanded critical care capacity and an effective therapeutic, would improve the success of intermittent distancing and hasten the acquisition of herd immunity. However, prolonged distancing, even if recurrent is likely to have negative economic, social, and educational consequences.
Anderson <i>et al.</i> (2020)	The authors examine mitigation mechanisms and their possibilities. This among others include minimising morbidity and mortality, avoiding an epidemic peak that overwhelms healthcare services and maintaining the effects on the economy within manageable levels.	How individuals respond to advice on how best to prevent transmission will be as important as government action if not more important. Efficient government communication strategies are vital to keeping the public informed of how best to avoid infection and these are additional support to manage the economic downturn.
Gong, <i>et al.</i> (2020)	The review of the economic impact of major epidemics at the micro-, sector-, and macro-level. The goal was to examine how to minimise economic loss while controlling the pandemic.	The authors propose three evaluation methods for prevention and control measures. The first method is based on the epidemiological model of viral transmission and adopts Susceptible, Infectious, or Recovered (SIR) model and its derived forms to test the practical effects of different measures through numerical simulation. The second evaluation method is the minimum cost accounting, while the third evaluation method is to study the individual's response strategy based on the minimum cost accounting.
McKee and Stuckler (2020)	Assessing the scale of the economic damage and examine how to protect the economy and save lives.	Even if the scale and nature of the pandemic and associated economic decline are difficult to quantify, without a doubt that there is a real risk of a vicious adverse spiral of illness and impoverishment. However, saving lives should be the first and most important priority. The scale of the measures taken to achieve such a containment will influence the stage of the pandemic and the capacity to intervene. Economic decline itself has an adverse effect on health. Crucial is to protect financial risk and to prepare for recovery by securing the future of companies, particularly of the small and medium enterprises.
Emerson and Johnson, (2020)	How should fiscal policy respond to the coronavirus (COVID-19) and how to design short- and long-term measures for lessening its consequences.	Policy needs to be robust to different eventualities and/or be flexible in the face of change. The key focus of an economic policy response should be to support affected businesses to help prevent this largely short-term event from having long-term "scarring" effects. Moreover, it is crucial to aid persons who lose income and to ensure continued delivery of public services. Finally, policymakers should consider whether broader interventions to support workers who do lose their jobs or face cuts in income would be appropriate.

**Table 2A (continuation). Summary of studies**

Eichenbaum, Rebelo, Trabandt (2020)	To spread the canonical epidemiology SIR model in order to study the equilibrium interaction between economic decision and epidemic dynamics.	The authors extend the SIR-macro model in three ways. First, they allow for the possibility that the mortality rate increases as the number of infections rises. Second, they include the probabilistic development of a cure for the disease. Third, they include the probabilistic development of a vaccine that inoculates susceptible people against the virus. Without containment, average consumption in the first year of the epidemic decreases by about 7 per cent. With containment, this fall is 22 per cent. They conclude that the best simple containment policy increases the severity of the economic recession but saves roughly half a million lives in the U.S.
Krueger, Uhlig, Xie (2020)	To examine the “Swedish Model” of epidemic intervention. The authors apply various models on the infection risk and provide theoretical results that demonstrate the importance of the elasticity of substitution across sectors.	The authors show how individually rational reallocation of economic activity across sectors is a strong mitigating force of the crisis even in the absence of explicit government intervention. According to their results, the “Swedish Model” of letting the epidemic play out without government intervention and allowing agents to shift their sectoral behaviour on their own, can enable a significant moderation of the economic and human costs of the COVID-19 crisis.
Greenstone and Nigam (2020)	To develop and implement a method to monetize the impact of moderate social distancing on deaths from COVID-19.	This social distancing takes many forms but its main aim is to keep people apart from each other by confining them to their homes in order to reduce contact rates. The study suggests that social distancing initiatives and policies in response to the COVID-19 epidemic have considerable economic benefits. Social distancing also increases the quality of care for non-COVID-19 medical problems by lowering the pressure on medical providers, services, and supplies.
McKibbin and Fernando (2020a)	Applying a global intertemporal general equilibrium model with heterogeneous agents, the goal is to examine the impact of various scenarios on macro-economic outcomes.	Even a contained outbreak could significantly impact the global economy in the short run. A range of policy responses will be needed both in the short term as well as in the coming years. The study demonstrates the scale of costs that might be avoided by greater investment in public health systems in all economies, but particularly in less developed economies. Global cooperation is crucial, principally in the sphere of health and economic development.
Furman (2020)	Analyse medical and economic policies which can aid and protect people from huge costs caused by COVID-19 and help to ensure that the economy is in a position to rebound quickly when the health threat is contained.	Public health measures are required to flatten the curve delaying and spreading out the extent of the virus. However, they will also impose large economic costs. Policy faces three constraints during a pandemic: uncertainty, time and capacity. For lessening adverse consequences targeted assistance using existing programmes, cash payments to households and efficient assistance to businesses are needed
Berglof and Farrar (2020)	To examine the impact of COVID-19 and propose the measures for lessening the adverse economic and social consequences.	COVID-19 pandemic is two-pronged health and economic crisis, and therefore it requires an adequate two-pronged response. Governments in richer countries are trying to protect their vulnerable citizens but they have an obligation in shielding and aiding vulnerable developing countries too. The required investment is minuscule compared to the social and economic costs of inaction.
Galbraith (2020)	To examine the adverse impact of COVID-19 on the US economy and propose measures for improvement, particularly for those the most vulnerable and in a need.	There is a crucial need to keep an optimal balance between purchasing power and the very limited range of goods for sale. People should be safe and secure in their homes and therefore there is a need to halt evictions, foreclosures and utility stoppages. The current long-term chaos in medical supplies must be brought under control and for that, it is important to develop a Health Finance Corporation to rationalise the medical supply chain.
Gourinchas (2020)	To examine pandemic and recession curves and propose public health policy measures aim to ‘flatten the curve’ by imposing drastic social	This ‘flattening of the curve’ would spread the pandemic over time, enabling more people to receive appropriate health treatment what should lower the fatality rate. The right combination of measures starts with health public policy with

	distancing and promoting health practices to reduce the transmission rate.	the goal to limit human infection. Succeeding fiscal and financial policies should be designed to attend the resulting shock to the economic system and prevent economic contagion
Correia, Luck, Verner (2020a, b)	What are the economic consequences of an influenza pandemic? Do non-pharmaceutical interventions (NPIs), such as social distancing, directed at reducing mortality during a pandemic necessarily have adverse economic effects?	Their result highlight that there is not necessarily a trade-off between reducing mortality and stabilising economic activity in a pandemic, especially if it highly disruptive for the economy through reductions in both supply and demand. The authors conclude that cities that were more severely affected by the 1918 Flu Pandemic experienced a sharp and persistent decline in real economic activity. Cities that applied early and extensive NPIs suffered no adverse economic effects over the medium term. Cities with longer NPIs grow faster in the medium term. NPIs can lead to both better economic outcomes and lower mortality rates. The direct negative effects of NPIs were counterbalanced by the indirect effects through mitigating the pandemic, which can cause lasting economic cost.
McKibbin and Fernando (2020b)	To explore a range of diverse scenarios for the spread of COVID-19, using a set of filters that convert the epidemiological expectations into economic shocks to reduced labour supply, growing costs of doing business (including disruption of production networks), a decrease in consumption due to shifts in consumer preferences, a rise in equity risk premia on companies, and increases in country risk premia based on exposure to the disease as well as vulnerabilities to changing economic conditions.	Experts have advised, and continue to advise, that zoonotic diseases will pose a threat to the lives of millions of people, with potentially major disruption to an integrated world economy. In the short term, central banks and treasuries have to support the functioning of disrupted economies. The longer-term responses primarily include sufficiently investment in the healthcare systems. All countries have to actively participate because it is too late to act once the disease has widespread in other countries and to decide to close borders once a pandemic has begun.
Wilder-Smith, Chiew and Lee (2020)	Can the COVID-19 outbreak be resolved with the same measures as for SARS? What is the role of social distancing among community members including cancellation of public gatherings, movement restriction, quarantine, medical observation and other measures aimed at control of pandemic?	There are some similarities but even more differences between COVID-19 and SARS, primarily because the availability of diagnostic assays was much faster for COVID-19 than for SARS. Furthermore, while the infectious period is different for mentioned viruses, the transmissibility might be higher for COVID-19 than for SARS. Containment of the COVID 19 pandemic should remain the most important task. The short-term cost of containment will be far lower than the long-term cost of non-containment. However, countries have to be aware that containment might not be possible in the longer period. Therefore, they should balance the cost and benefits of public health measures.
Marron (2020)	To examine the threat of COVID-19 to the overall US economy.	There is a need to propose a four-part economic strategy: accept economic losses that protect health, help people get through the sudden income loss primarily through broadening existing safety net programmes, to protect productive capacity and to make full use of the economy's productive capacity once the virus recedes.
Hynes, Linkov and Trump (2020)	To analyse who is particularly exposed and vulnerable to COVID-19. What is the impact of pandemics on international relations and globalisation?	The COVID-19 epidemic and applied measures to counteract it are likely to disproportionately affect poorer people. The most exposed are those working in the "gig economy", who often work on short contracts, sometimes with weak or no social protections, with limited options for working remotely, and with risks of job loss and forgone earnings if they have to remain away from their place of work due to illness. Probably there will be longer-term, structural effects: firms may retreat from globalisation, seeking shortened supply chains and suppliers located in countries less predisposed to disruption. The international financial system has already experienced the consequences of COVID-19, with increased volatility and sharp drops in share prices.

Bruinen de Bruina <i>et al.</i> (2020)	To present an analysis of risk mitigation measures taken by various countries around the world facing the current COVID-19 outbreak. Different measures such as mobility restrictions, physical distancing, socio-economic restrictions, hygienic measures communication and international support mechanisms have been grouped and are evaluated in terms of the nature of the actions taken and their qualitative early-perceived impact.	Regarding mobility restrictions, analysis of the COVID-19 outbreak advocates that the effects of travel limitations are important for national and international bodies dealing with public health response planning. There are significant differences between countries regarding the closing down of public places. The most probable reason is that these restrictions are expected to impose a major impact on the functioning of the current economic activities and way of life. In Western democracies personal action, rather than government activity, might be the most important issue comprising of early self-isolation, seeking medical advice remotely and physical distancing.
Fujita and Hamaguchi (2020)	To examine the COVID-19 pandemic from a spatial economics perspective because the initial outbreak centred around the megalopolis in the eastern US and in the EU. The next goal is to discuss the possible impact of the COVID-19 pandemic on the future direction of globalisation.	While globalisation represents civilisational progress, it also augmented the COVID-19 pandemic. Many countries took emergency measures to stop the propagation of the virus by blocking their national borders and restricting the internal movement of people. Humanity is therefore facing a novel situation regarding the movement of people, goods, money, and information. The cost of moving people has significantly increased, and the flow of goods and money has become unreliable, while online information exchange is more active than ever. With the future gradually economic recovery, the global economy returns to the pre-crisis normal are under a serious question mark.
Primorac (2020)	To recapitulate and interpret key information about COVID-19 based on the comprehensive review of the literature	Infection is not preventable at this stage, but it can be significantly slowed down. This is the responsibility of all citizens. Due to the large amount of false and/or unreliable information that is available in mass media and everyday communication, it is crucial to highlight some reliable addresses where one can find verified expert information on the measures to combat the spread of the disease and the state of the pandemic.

*Source:* authors' analysis.