

Impact of COVID-19 on real effective exchange rates of EU member countries: Implications for a monetary union

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There is a lack of close historic parallel to the economic impact of COVID-19. The COVID-19 shock has led to most economies in the Euro area experiencing exchange rate pressures, enormous job losses and contractions in output. By recognising that a stable currency has the tendency to reverse some of these challenges, this study investigates the impact of the pandemic on the exchange rate of all EU member countries. The main objective is to find the relationship between the government's lockdown measures measured by the Stringency index and monthly exchange rate per the USD for all EU member countries. Using both a correlation and a Dynamic Ordinary Least Square (DOLS) model, the results show that as lockdown measures intensified, countries in Europe lost their competitiveness in the long-run. In the short-run however, only Cyprus, the Czech Republic and Greece lost their competitiveness as the lockdown measures intensified. The results also confirm the asymmetry of shocks in Europe, further questioning the benefits for countries seeking to adopt the Euro.

Keywords: European Union, exchange rate, monetary union, COVID-19.

1. Introduction

The widely held view that the rise of the euro as a regional anchor currency may well herald an enlargement of the European Monetary Union (EMU) appears to have been challenged by the COVID-19 pandemic. Currently, the euro (€) is the official currency of 19 out of 27 European Union (EU) member states, which together constitute the Eurozone, officially called the euro area. According to Dabrowski (2019), the first two decades of euro functioning have confirmed its stability, as it is currently the second most important global currency. Even though the traditional currency literature suggests structural criteria such as factor mobility, trade integration and regional production patterns to assess a country's readiness to join a monetary union, recent literature, however, points to the importance of flexible nominal exchange rates in this regard. The potential benefits of a single European currency include the elimination of transaction costs for firms and travellers, and the reduction of exchange rate uncertainty (Funke 1997).

The COVID-19 pandemic is showing no sign of slowing down as countries develop effective ways of reducing infection rates. As of May 9, 2021, the European Region – as defined by the World Health Organization (WHO) – reported over 897,000 new cases and just under 19,000 new deaths, a 25% and 18% decrease, respectively, compared to the week ending May 4, 2021 (WHO 2021). The highest numbers of new cases were reported from Turkey, France and Germany. According to Feng et al. (2021) and Aslam et al. (2020), the COVID-19 pandemic is an economic shock with arguably no historical comparison. Despite this there are limited studies on the impact of the

pandemic on the exchange rate of countries in Europe. Since most of these countries trade with each other, the nominal exchange rate may not be a good measure of competitiveness among the investigated countries. This is what necessitates the use of the REER, which is also a measure of international competitiveness of a nation in comparison with its trade partners. The REER gives an important information to market participants regarding the mix of foreign versus domestic goods on both the production and the purchasing side. An increasing REER will generally mean that a country is losing its competitive edge.

Using both a correlation and a Dynamic Ordinary Least Square (DOLS) model, this study investigates the impact of the pandemic on the exchange rate of countries in Europe. The results show that as lockdown measures intensified, countries in Europe lost their competitiveness in the long-run. In the short-run however, only Cyprus, the Czech Republic and Greece lost their competitiveness as the lockdown measures intensified (the Czech Republic still uses its own currency, while Cyprus and Greece have been subjects of an European Stability Mechanism (ESM) program). The results also confirm the asymmetry of shocks in Europe, further questioning the benefits for countries seeking to adopt the Euro.

The rest of the paper discusses the body of literature on the subject, the data and method used to analyse the impact of the pandemic on the exchange rate of countries in Europe, and, finally, a conclusion and recommendation section.

2. Theoretical background and literature review

Prior to the introduction of the Euro in 2002, there were questions about whether Europe is ready for a common currency. Studies at the time focused on the pros and cons of joining a currency union. The main economic cost as espoused by these studies results from the loss of nominal exchange rate flexibility as an instrument for real exchange rate (RER) adjustment between regions exposed to asymmetric shocks (Von Hagen–Neumann 1994, Funke 1997).

Even though the traditional currency literature suggests structural criteria such as factor mobility, trade integration and regional production patterns to assess a country's readiness to join a monetary union, recent literature, however, points to the importance of flexible nominal exchange rates in this regard. This is because a flexible exchange rate serves as a shock absorbing mechanism in the case of strong asymmetric shocks (Von Hagen–Neumann 1994, Beirne–Bijsterbosch 2011, De Grauwe–Schnabl 2008, Belke–Gros 2001). Devereux et al. (2003), on the other hand, argue that the acceptance of the euro will lead to European prices becoming more insulated from exchange rate volatility. This effect, according to Devereux et al. (2003), can also be found in the US. The assumption of a sticky price intertemporal model by Devereux et al. (2003) makes their conclusion similar to that of Von Hagen and Neumann (1994). Thus, the loss involved in not making use of the nominal exchange rate as an instrument of macroeconomic adjustment is smaller when shocks require little movement of the real exchange rate to establish an equilibrium. The potential benefits of a single European currency include the elimination of transaction costs for firms and travellers and the reduction of exchange rate uncertainty (Funke 1997).

A lot of studies have, thus, concluded that shocks have different effects on countries in Europe. Investigating the nature of shocks in Europe and in Germany, Funke (1997) found that demand and supply shocks in the various countries in Europe are not highly correlated (Bjørnland 2004). Habib (2002) identified the Czech Republic as an example of a country where the exchange rate could not act as an external shock absorber and insulate the country's domestic monetary policy completely from such shocks. This view, though, is contrary to findings by Edwards and Yeyati (2005), who found that terms of trade shocks get amplified in countries that have more rigid exchange rate regimes. Like Funke (1997), Sekkat and Mansour (2005) also found that exchange rate fluctuations do indeed have different impacts across sectors in Europe. These differences, according to Sekkat and Mansour (2005), are non-negligible due to dissimilarities among member states' industrial structures. Bjørnland (2004), on the other hand, proposes that relinquishing exchange rate independence should come at little cost, making exchange rate independence attractive.

The evidence of asymmetry in Europe has the tendency of making the exchange rate pass-through (ERPT), a measure of how responsive prices are to the exchange rate, in Europe not to be constant over time, as discovered by Comunale and Kunovac (2017). According to Comunale and Kunovac (2017), the level of ERPT is dependent on the composition of economic shocks governing the exchange rate in European countries. Comunale and Kunovac (2017) also contend that the ERPT is strongest when the shocks originate from monetary policy or the exchange rate. Bénétrix and Lane (2018) make the same case but for fiscal shocks in Europe. They found that the impact of fiscal shocks differs across different types of government spending in Europe, with shocks to public investment generating larger and more persistent real appreciation than shocks to government consumption.

Theoretically, there is a significant relationship between fiscal shocks and the real exchange rate. Fiscal expansions may induce real appreciations, which may contribute to problems with competitiveness that may be hard to reverse inside a monetary union. Therefore, in designing an optimal fiscal policy, the relationship between various types of government spending and the real exchange rate cannot be ignored (Bénétrix and Lane, 2018).

The COVID-19 pandemic qualifies as a trade shock. It also qualifies as a fiscal and monetary policy shock. According to Feng et al. (2021), the COVID-19 pandemic has affected the world economy and various sectors of the economy. Many countries around the world have been forced to impose, among other measures, travel restrictions, border shutdowns, lockdowns, and social distancing in order to control the pandemic (Aslam et al. 2020). A sudden shock like this – as experienced during the 2008 financial crisis – has the tendency to cause structural changes in both commodity and financial markets, which can then have potential asymmetric effects on market efficiency, portfolio allocation, and volatility spill overs. The impact of the pandemic on the exchange rate market cannot be understated either, as most central banks scrambled to adjust their monetary policy frameworks to address the feedback loop between exchange rate movements and capital outflows in a bid to weather the financial setbacks from the COVID-19 pandemic. The concern is driven by the decrease in aggregate and foreign demand, which has the tendency to put pressure on the currencies the world over (Aslam et al. 2020).

Investigating the exchange rate volatility response to COVID-19 pandemic and government interventions over the period January 13, 2020 to July 21, 2020, Feng et al. (2021) found that an increase in confirmed cases does significantly raise exchange rate volatility. They also found that school closures, restrictions on internal movements, public information campaigns, income support, fiscal measures, and international aid all had an inhibiting effect on exchange rate volatility. Studying the efficiency of the exchange rate market over the period October 1, 2019 to 31 March 31, 2020, Aslam et al. (2020) found, among other things, a decline in the efficiency of forex markets during the COVID-19 outbreak. While Feng et al. (2021) used a system GMM estimation, Aslam et al. (2020) used multifractal detrended fluctuation analysis (MF-DFA) in their analysis.

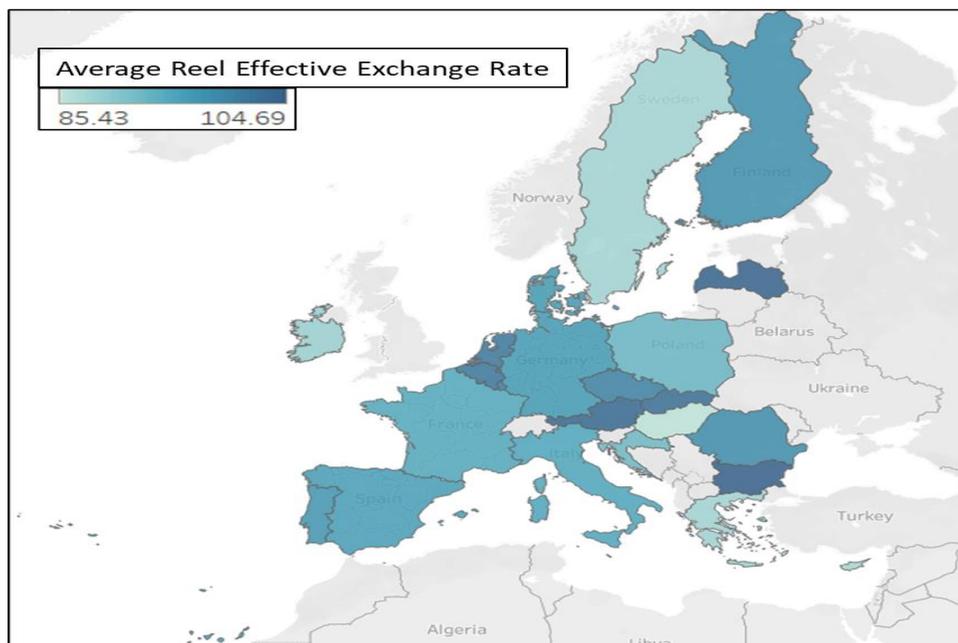
The reviewed literature reveals that there are limited studies on the impact of the COVID-19 response measures and the exchange rate in Europe despite the recognition that the impacts of such shocks are not symmetric in the sub-region. Those that studied the phenomenon – Feng et al. (2021) – considered the various measures in dealing with the pandemic in isolation, whereas most of the measures were applied as combined solutions in reality. As a result of these drawbacks, this study seeks to investigate the relationship between the composite measures instituted to deal with the pandemic and the exchange rate in Europe – recognising the fact that not all European countries have adopted the Euro as a domestic currency.

3. Data and methodology

The data for this study were sourced from the International Monetary Fund's (IMF's) international financial statistics and Our World in Data – a database for indicators on World problems. The data on the nominal exchange rate and the real effective exchange rate were sourced from the international financial statistics database. The data on the stringency index was sourced from the Our World in Data database. The stringency index is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest). The nominal exchange rate used in this study is the National Currency Per U.S. Dollar, at the End of Period rate. The effective exchange rate used is the Real Effective Exchange Rate (REER) based on Consumer Price Index (CPI). According to the IMF's international financial statistics, it reflects continuous updating of weights and the incorporation of a larger set of trading partners. It replaces a previous estimate based on fixed-base weights from 2004–2006. The REER indices used in this study are calculated using weights updated every three years starting in January 2004. As mentioned earlier, the REER provides important information to market participants regarding the mix of foreign versus domestic goods on both the production and the purchasing side. An increasing REER will generally mean that a country is losing its competitive edge. External shocks – COVID-19 – will be expected to generally result in changes in the equilibrium real exchange rate of a country. If a country practices a fixed exchange rate regime, then this type of adjustment is expected to take place through changes in domestic prices (Edwards–Yeyati 2005). If there is a current account gap, it is usually closed by an exchange rate adjustment. A depreciation of the REER usually leads to an increase in the debt ratio. In this case, a fiscal adjustment may be

helpful. Due to data unavailability for Estonia, Lithuania and Slovenia, this paper studies 24 out of the 27 countries in Europe.

Figure 1 Distribution of Real Effective Exchange Rates in the EU during first year of COVID-19 (2020)



Source: Authors' construct

After conducting an ordinary correlation analysis, this study has tested for co-integration in the variables and accepted the null hypothesis of no cointegration in the study variables. As a result, a Dynamic Ordinary Least Square (DOLS) model is used for this study – with the dependent variable being the REER, and the independent variable being the stringency index. The study does not employ the models used by Aslam et al. (2020) and Feng et al. (2021) due to the nature and frequency of the variables used in this case. Also, because the interest rate of most countries in Europe are close to zero, the traditional approach for external balance assessment cannot be used in this study.

The DOLS model used here is an extension of the models proposed by Saikkonen (1992) and Stock and Watson (1993), which was applied to a panel data setting. This can be achieved by augmenting the panel cointegrating regression equation with cross-section specific lags and leads of ΔX_{it} to eliminate the asymptotic endogeneity and serial correlation. For the pooled DOLS estimator, an OLS method is used to estimate an augmented cointegrating regression equation of the form below.

$$y_{it} = X_{it}'\beta + \sum_{j=-q_i}^{r_i} \Delta X_{it} + \delta_i - v_{1it} \quad (1)$$

Where y_{it} and X_{it} are the dependent and the independent variables purged of the individual deterministic trends. The short-run dynamics coefficients δ_i are allowed to be cross-section specific. The pooled DOLS estimator may be written as follows:

$$\begin{bmatrix} \hat{\beta}_{DP} \\ \hat{\gamma}_{DP} \end{bmatrix} = \left(\sum_{i=1}^N \sum_{t=1}^T W_{it} W_{it}' \right)^{-1} \left(\sum_{i=1}^N \sum_{t=1}^T W_{it} y_{it}' \right) \quad (2)$$

$$W_{it}' = (X_{it}', Z_{it}')' \quad (3)$$

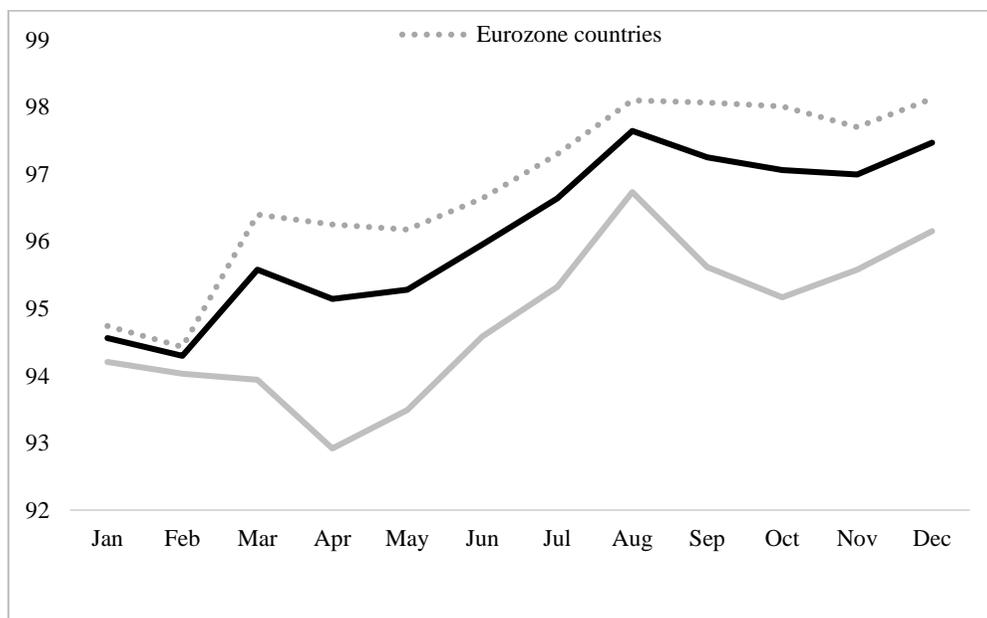
Where Z_{it} are the regressors formed by interacting the ΔX_{it+j} terms with cross-section dummy variables. All the variables are converted to their natural logs to reduce the effect of extreme variables.

4. Results and analysis

4.1. Performance of currencies of EU member countries during first year of COVID-19

First, the study used descriptive statistics to describe the average REER for each of the 27 EU member countries during the first year of the COVID-19 pandemic. It was found that Bulgaria (104.69), Latvia (104.23), Austria (103.55), Slovakia (102.60), and Belgium (101.5) had the highest REER, respectively, whereas Hungary (85.43), Cyprus (87.18), Sweden (87.73), Greece (87.744) and Ireland (88.38) had the lowest average REER during the first year of the pandemic (see Appendix, Table 2).

Figure 1 Trend of monthly Real Effective Exchange Rate for EU member countries during first year of COVID-19



Source: Authors' construct

Further descriptive analysis of the average REER for the EU member states has revealed that, on the average, the EU countries lost competitiveness as indicated by an REER of 96.16 during the first year of the COVID-19 pandemic. However, the Eurozone countries were more competitive than the EU countries that are yet to adopt the Euro as their national currency. In the early phase of the pandemic, EU countries using their national currencies gained competitiveness as they experienced a fall in their REER, however, over the one-year period they lost their competitiveness. This analysis does not, however, consider the relationship between the lockdown measures and the level of competitiveness in Europe (see Figure 1).

4.2. The impact of COVID-19 on the currencies of EU member countries

Correlation analysis conducted to determine if there was any significant relationship between the lockdown measures various EU governments used to limit the spread of the Coronavirus and the exchange rates of the respective EU member countries against the US dollar. The correlation analysis conducted has revealed a negative relation between the natural log of the nominal exchange rate and the REER over the first year of the pandemic. There was also a negative relationship between the natural log of the nominal exchange rate and the log of the stringency index over the study period – this relationship was however not significant. There was, however, a positive but significant relationship between the REER and the stringency index in the first year of the pandemic.

Table 1 DOLS long-run regression output for the REER

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNSINDEX	0.004541	0.000842	5.390479	0.00000
R-squared	0.963438			
Adjusted R-squared	0.955275			

Source: own construction

The results of the correlation analysis (see Appendix, Table 1) suggest that as countries in the EMU implemented stricter measures to deal with the pandemic, they lost competitiveness as the REER increased. This result is confirmed also by the DOLS regression result (see Table 1) as there was a significant and positive relationship between the log of the REER and the log of the stringency index in the studied countries in the first year of the pandemic. That is, a unit increase in the stringency index leads to 0.004541 increase in the REER – a loss in trade competitive – in the long run. This typically suggests that exports were more expensive than imports in the first year of the pandemic in the Euro area.

Table 2 Short-run analysis for the REER

	Intercept	D(LNSINDEX)
Austria	4.627	-0.005
Belgium	4.609	-0.014
Bulgaria	4.637	-0.004
Croatia	4.510	-0.002
Cyprus	4.451	0.003
Czech Republic	4.585	0.004
Denmark	4.558	-0.003
Finland	4.577	-0.013
France	4.537	-0.009
Germany	4.559	-0.012
Greece	4.456	0.003
Hungary	4.430	-0.001
Ireland	4.467	-0.006
Italy	4.541	-0.013
Latvia	4.633	-0.001
Luxembourg	4.600	-0.003
Malta	4.531	-0.010
Netherlands	4.605	-0.004
Poland	4.514	-0.006
Portugal	4.561	-0.010
Romania	4.580	-0.007
Slovakia	4.618	-0.005
Spain	4.551	-0.007
Sweden	4.467	-0.018

Source: own construction

The coefficients for the short-run dynamics show that the impact of the lockdown measure was diverse in the study countries. In the short-run only three of the 24 countries – Cyprus, the Czech Republic and Greece – lost their competitiveness as a result of the lockdown measures. This may also mean that the remaining 21 countries were able to close the current account gap in the short-run by allowing the exchange rate to adjust. A very important finding worth noting is that these three countries all have a floating exchange rate regime. The remaining 21 countries gained some competitive edge in the short-run as a result of the lockdown measures. This confirms studies by Funke (1997) and Sekkat and Mansour (2005) that the effect of shocks in Europe is asymmetric. The result is not conclusive in terms of the benefit or otherwise of belonging to the European Monetary Union (EMU) in the presence of a shock like COVID-19. A diagnostics test conducted for DOLS regression model rejected the null hypothesis of a normality test.

Conclusion

The review of the literature has shown that shocks affect countries in Europe differently, further hindering the adoption of the single currency by some members of the European union. Feng et al. (2021) and Aslam et al. (2020) confirm that the COVID-19 pandemic

is an economic shock with arguably no historical comparison. Due to its recent nature, there are limited studies investigating the impact of COVID-19 on the exchange rate of countries in the European Union. The few studies – Feng et al. (2021) – had considered the various measures in dealing with the pandemic in isolation, whereas most of the measures were applied as combined solutions. As a result, the present study has sought to investigate the impact of the stringency index – a measure based on nine response indicators including school closures, workplace closures, and travel bans – and the real effective exchange rate over the first year of the COVID-19 pandemic.

The results have shown that as lockdown measures intensified, countries in the EU lost their competitiveness in the long-run. In the short-run, however, only Cyprus, the Czech Republic and Greece lost their competitiveness as the lockdown measures intensified. The results have also confirmed the asymmetry of shocks in Europe, further questioning the benefits for countries seeking to join the EMU. That notwithstanding, on average, Eurozone countries (96.83) had higher REER when compared with EU member states that still use their national currencies (94.81) during the first year of the COVID-19 pandemic – indicating that competitiveness in the region was being driven by countries that have not adopted the Euro, although the performance of the currencies was not uniform across countries due to unique country specific factors. We, therefore, recommend that future studies should investigate the country specific factors that influenced the performance of the REER in the respective EU member states.

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Appendices

Appendix Table 1 Correlation analysis

	LNFX	LNREER	LNSINDEX
LNFX	1 -----		
LNREER	-0.316 (-5.637)*	1 -----	
LNSINDEX	-0.030 (-0.512)	0.107 (1.821)***	1 -----

t-statistics in parenthesis (); Significance level: *1%, **5%, ***10%

Source: own construction

Appendix Table 2 Real Exchange Rate Performance of EU Member countries during first year of COVID

Rank	Country	Currency	Average of REER
1	Bulgaria	National	104.69
2	Latvia	Euro	104.23
3	Austria	Euro	103.55
4	Slovakia	Euro	102.60
5	Belgium	Euro	101.55
6	Netherlands	Euro	101.25
7	Luxembourg	Euro	100.86
8	Czech Republic	National	99.98
9	Romania	National	98.73
10	Finland	Euro	98.23
11	Portugal	Euro	97.10
12	Germany	Euro	96.71
13	Denmark	National	96.69
14	Spain	Euro	96.12
15	Italy	Euro	95.01
16	France	Euro	94.72
17	Malta	Euro	94.02
18	Poland	National	92.78
19	Croatia	National	92.45
20	Ireland	Euro	88.38
21	Greece	Euro	87.74
22	Sweden	National	87.73
23	Cyprus	Euro	87.18
24	Hungary	National	85.43