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Abstract

We examine the role of demand composition in explaining the trade collapse and recovery during the ongoing covid-19 crisis. We apply an import-intensity-adjusted measure of demand to examine import trends in 40 advanced and emerging economies over the period 1Q95 to 4Q20. We focus on the crisis periods related to covid-19 and the global financial crisis in 2008–2009. As during the global financial crisis, we find that import-intensity-adjusted demand is a key factor contributing to trade developments during the covid-19 crisis. The analysis also reveals substantial differences between the current crisis and the global financial crisis. Trade decline during the global financial crisis was heavily investment-led. In the current crisis, consumption and import demand from the service sector have had much larger roles. The recovery of trade has been notably faster during the covid-19 crisis and led by exports as opposed to the much more important role played by domestic demand during the global financial crisis.

Keywords: International trade, covid-19, import-intensity-adjusted demand
JEL codes: F10, F14, F17, G01

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1 Introduction

The global economy and global trade flows have been hit hard by the covid-19 crisis. The trade collapse of 2Q20 was even more severe than during the trough of the global financial crisis (GFC) in 2009. However, taking into account the substantial fall in the GDP of most countries during the covid-19 crisis, the relative trade contraction seems milder compared to the GFC. During the GFC, the combined volume of GDP of the OECD countries contracted by about 5 % and the combined volume of imports of goods and services by 17 % from peak to trough. The corresponding figures for the covid-19 crisis were –12 % and –20 %, respectively. Trade has also recovered rapidly since the trough in 2Q20. Pre-crisis levels were almost back by the end of the year. While the unprecedented trade collapse during the GFC was stunning in its magnitude, the trade contraction from the covid-19 crisis has actually been milder than feared.

In this paper, we examine potential factors that may explain this development. We focus on demand elasticity of imports, the importance and structure of expenditure changes and the role of service sector demand. We estimate a traditional import regression featuring a measure of import-intensity-adjusted demand and import prices for 40 advanced and emerging economies using quarterly data from 1995 to 2020. We apply the estimation results to examine and compare the trade collapses and following recoveries in 2009 and 2020 focusing on the role of expenditure changes in explaining the trade developments during the crises. To take into account the role of the service sector demand in the trade collapse, we perform a similar estimation for demand composition from the production-side perspective.

The contribution of the paper is two-fold. First, we provide a first analysis of the covid-19-induced trade collapse from the viewpoint of demand composition and in comparison to the GFC. Second, we introduce a novel measure for import-intensity-adjusted demand to illustrate the role of import demand arising from the service sector. The results complement earlier studies on the role of demand and supply factors in the current trade collapse, as well as the discussion on evolution of demand elasticity in global trade.

The results suggest that lower demand elasticity of imports does not explain the relative mildness of the covid-19 trade collapse. Import-intensity-adjusted demand, however, is a key explanatory factor, while the importance of supply-side factors appears more limited (at least by the end of our sample in 4Q20). Our results suggest that there appears to be some differences between advanced and emerging economies. The contribution of demand factors is on average slightly higher in emerging countries than in advanced economies. In addition, the contribution of domestic demand components, particularly consumption, is higher on average in emerging economies. Correspondingly, the contribution of export demand is larger on average in the advanced economies.

In comparison to the GFC, our results suggest that import-intensity-adjusted demand may have accounted for an even larger share of trade collapse during the current crisis. There are also notable differences in the demand composition effects between the crises. During the GFC, the decline in demand was mainly investment-led. In the current crisis, the contribution of consumption has been much more significant, and the recovery of trade much faster. The current recovery has been export-led, while the contribution of domestic demand was more important during the GFC. Our novel import-intensity-adjusted demand measure illustrates the important role of the import demand arising from the service sector during the covid-19 crisis.

The paper is organized as follows. Section 2 provides a review of earlier studies. Section 3 presents the theoretical framework forming the basis of our analysis and construction of the import-intensity-adjusted demand measure. Section 4 contains the empirical analysis describing the data and estimation methodology used and the results obtained from the analysis. Section 5 concludes with a brief discussion of the results.

2 Previous literature

Our paper relates primarily to the emerging literature on economic effects of the covid-19 crisis. So far there is limited amount of analysis specifically related to trade. Bonadio et al. (2020) find that, on average, about a third of the global GDP contraction during the covid-19 crisis was due to transmission of shocks through trade associated with global value chains. Several papers have sought to disentangle the importance of demand and supply factors in the trade collapse, but the evidence is mixed. In a cross-country setting, Espitia et al. (2021) find that both factors play an important role with substantial variation in the effects across sectors.

The dominance of *demand factors* is supported by results of Liu et al. (2021) for Chinese exports, Meier & Pinto (2020) for US imports from other countries than China and those of Kejzar & Velic (2020) for the EU trade. The analysis in Simola (2021) points to the importance of demand factors. The findings of Hayakawa & Mukunoki (2021) stress the importance of *supply factors* in intra-Asian machinery trade and Meier & Pinto (2020) for US imports from China.

Guerreri et al. (2020) argue that a supply shock from covid-19 could trigger a demand shock even larger than the original shock. To our knowledge, the only analysis on the role of demand composition in the covid-19 crisis is Andersson et al. (2020). Their results illustrate the importance of *external factors* in the GDP contraction of the euro area, when controlling for import intensity of exports.

There are several studies on the GFC trade collapse, which was mainly associated with the intensive margin and falling quantities. The literature suggests that compositional effects associated with changes in final expenditure explain most of the contraction in trade during the GFC. According to these studies, expenditure changes accounted for 65–80 % of the trade collapse (Baldwin, 2009; Bems et al., 2013). There is also evidence that inventory adjustment related to vertical production chains (the "bullwhip effect") was an important factor (Alessandria et al., 2011; Altomonte et al., 2012; Zavaczka, 2012). Restricted access to finance also played a role (Behrens et al., 2013; Bricogne et al., 2012; Chor & Manova, 2012), whereas trade policy and trade costs are considered a minor factor (Eaton et al., 2016; Kee et al., 2013).

The most important study for our analysis is Bussiere et al. (2013), although a similar methodology is applied in several subsequent studies as discussed below. Bussiere et al. (2013) show that changes in demand composition were a major factor in explaining the trade collapse during the GFC by introducing a new demand measure, import-intensity-adjusted demand (IAD), to account for the import intensity of various demand components. The IAD performs better than the traditional demand measure GDP in explaining import changes in their estimations. The superiority of IAD compared to other demand measures has also found support in subsequent research (Auboin & Borio 2018; Gregori & Giansoldati 2020). Bussiere et al. (2013) decompose the IAD into subcomponents. Notably, they find that the sharp fall in import demand for investment was a key factor contributing for the fall of imports during the GFC.

The findings of Bussiere et al. (2013) are supported by results from studies applying different frameworks. Bems et al. (2011) abstract from price changes and focus on isolating the expenditure changes. Their analysis is based on a global input-output framework that depicts production linkages between countries. They use observed sectoral expenditure changes to generate predictions for changes in trade during the crisis. Their results point to the important role of durable goods and vertical specialization in the trade collapse. Eaton et al. (2016) employ a dynamic multisector general equilibrium model to investigate the role of various factors in the trade collapse during the GFC. They find that the major driver of the collapse was a decline in the efficiency of investment in durable manufactures that shifted spending away from durables, causing a decline in the manufacturing sector. Using highly disaggregated trade data for US imports, Levchenko et al. (2011) find support for compositional effects and vertical linkages as the main explanations for the exceptional trade collapse.

Finally, our paper relates to the literature examining the sluggish trade development of the past decade with respect to changes in the demand elasticity of imports. Both cyclical and structural factors have been found to explain the trade slowdown, and there is no consensus among researchers as to whether demand elasticity of imports has changed in recent decades (Hoekman 2015).

Bussiere et al. (2013) find no evidence of a structural break in the demand elasticity of imports in 1985–2011 using the IAD as a demand measure. Ollivaud & Schwellnuss (2015) arrive at the same conclusion with GDP emphasizing the appropriateness of using market exchange rates instead of PPP measures for global GDP. Using both a reduced-form approach with IAD and a structural approach, Aslam et al. (2018) find weak development in demand (and investment demand, in particular) as the main factor explaining the slowdown. Auboin & Borino (2017) reach similar conclusions. Their analysis suggests that the demand elasticity of imports remained relatively stable in 1995–2015. Analyzing the world input-output tables, Timmer et al. (2021) argue that the apparent import elasticity decline with respect to GDP largely reflects demand composition factors, particularly weaker demand for investment goods.

Using GDP in PPP terms for the period 1970 to 2013, Constantinescu et al. (2020) conclude that demand elasticity of imports increased in the 1990s, then went into decline at the turn of the millennium. Martinez-Martin (2016) utilizes the IAD measure for a country-level examination of the 1960–2015 period. His results point to a structural break in the import elasticity at around 2000 and 2009. The findings in ECB (2016) on the global trade slowdown emphasize the role of geographical shifts in demand to emerging economies, where demand elasticity of imports is evaluated to be lower than in advanced economies. However, even studies that find structural factors essential, are careful to mention the important role of cyclical demand factors in the recent slowdown of global trade (Constantinescu et al., 2020; Haugh et al., 2016; Martinez-Martin, 2016).

3 Theoretical framework

Our analysis is based on the standard constant elasticity of substitution (CES) demand system widely used in the empirical trade literature (Bussiere et al., 2013; Constantinescu et al., 2020; Escaith et al., 2010). In this framework, the volume of import demand is a function of aggregate demand, i.e. an aggregate of individual components of demand such as consumption and investments, and import prices. Imports (in log terms) are thus determined by

$$\ln M_t = \ln D_t + \beta_p \ln P_{M,t}, \quad (1)$$

where D_t is aggregate demand (a CES aggregator of domestic and imported goods) and $P_{M,t}$ is the relative import price basket. In the traditional framework, (long-term) elasticity of imports to aggregate demand is restricted to be equal to one in equation (1). The coefficient β_p should be negative implying that an increase in import prices leads to a fall in imports.

Aggregate demand D_t has traditionally been measured by GDP in the literature. The growth patterns and the import content of different demand components, however, varies widely. Investment is typically the most volatile and most import-intensive demand component, while consumption tends to develop more smoothly and rely much more on domestic supply (see Appendix Table

A1). The volatility and import content of exports also varies widely across countries. To account for this variation in the demand components, Bussiere et al. (2013) introduce a novel measure for demand, the import intensity adjusted demand (IAD). Since its introduction, the measure has been used in several studies, e.g. Aslam et al. (2018), Auboin & Borino (2017), Gregori & Giansoldati (2020) and Martin-Martinez (2016).

The IAD can be calculated on the basis of input-output tables. The input-output tables depict the structure of the production network of an economy. They show the amount of domestic and foreign inputs needed to produce one unit of output in a particular country.[1] The import content of various demand components can be calculated in a straightforward way from the input-output tables as shown in Bussiere et al. (2013) and presented below.

First, we assume that there are *S* sectors and *K* final demand components in the economy. Production of all *S* sectors is used both as an input to other sectors and directly to satisfy final demand. The total output from sector *i* needed to satisfy the final demand of component *k* is given by

$$x_{i,k} = \sum_{j=1}^{S} a_{i,j}^{d} x_{j,k} + f_{i,k}^{d}$$

or in matrix format

$$\mathbf{X} = \mathbf{A}^{d}\mathbf{X} + \mathbf{F}^{d},$$

where X is the matrix of domestic output, $\mathbf{A}^d$ is the matrix of domestic input coefficients and $\mathbf{F}^d$ is the matrix of final demand components for domestic production. Now domestic output can be written as

$$\mathbf{X} = (\mathbf{I}-\mathbf{A}^{d})^{-1}\, \mathbf{F}^{d}, \qquad (2)$$

where $(\mathbf{I}-\mathbf{A}^{d})^{-1}$is the Leontief inverse.

The imports of intermediate inputs needed for the production of domestic output are given by

$$m_{i,k}^{inp} = \sum_{j=1}^{S} a_{i,j}^{m} x_{j,k}$$

or in matrix format

$$\mathbf{M}^{inp} = \mathbf{A}^{m}\mathbf{X}$$

[1] For more on input-output tables, see e.g. Timmer et al. (2015).

Substituting (2) gives

$\mathbf{M}^{inp} = \mathbf{A}^m (\mathbf{I}-\mathbf{A}^d)^{-1} \mathbf{F}^d$,

where $\mathbf{M}^{inp}$ is the matrix of imported inputs and $\mathbf{A}^m$ is the matrix of imported input coefficients.

Imports of final products can be expressed as

$\mathbf{M}^{fin} = \mathbf{F}^m$

Then we can get total imports by summing the imports of intermediate inputs and final goods:

$\mathbf{M} = \mathbf{M}^{inp} + \mathbf{M}^{fin} = \mathbf{A}^m (\mathbf{I}-\mathbf{A}^d)^{-1} \mathbf{F}^d + \mathbf{F}^m$.

The import share or import intensity of all demand components *k* can be calculated from

$$\omega_k = \frac{\boldsymbol{uM}_k^{fin} + \boldsymbol{uM}_k^{inp}}{\boldsymbol{uF}_k^d + \boldsymbol{uF}_k^m} = \frac{\boldsymbol{uA}^m(\boldsymbol{I}-\boldsymbol{A}^d)^{-1}\boldsymbol{F}_k^d + \boldsymbol{uF}_k^m}{\boldsymbol{uF}_k^d + \boldsymbol{uF}_k^m} \qquad (3)$$

where **u** is a vector with all elements equal to 1 and the subscript *k* refers to the *k*-th column of each matrix.

Using these import intensities we can construct a measure for import adjusted demand IAD for a country in time *t* in a following way:

$$IAD_t = C_t^{\omega_{C,t}} I_t^{\omega_{I,t}} X_t^{\omega_{X,t}} ,$$

where *C* is consumption, *I* is investment, *X* is exports and $\omega_{k,t}$ is the import intensity. Expressing in logarithmic form, we get:

$$\ln IAD_t = \omega_{C,t} \ln C_t + \omega_{I,t} \ln I_t + \omega_{X,t} \ln X_t. \qquad (4)$$

The weights $\omega_{k,t}$ are time-varying and normalized in each period so that they sum to one.

Bussiere et al. (2013) show that in the framework of translog GDP function the IAD is the appropriate measure for aggregate demand and that in this case the elasticity of imports to aggregate demand is not restricted to one.

4 Empirical analysis

In the empirical analysis, we first estimate the baseline regression on import change. We look to see if the demand elasticity of imports has declined as it could explain the relatively mild contraction in imports. We next apply the estimated demand coefficients for the current crisis and the GFC to see how well they explain trade collapse and recovery during each crisis. We also decompose the aggregate demand effect to sub-components and compare their contributions in the two crises. Finally, we re-estimate the import regression by using our novel measure for import-intensity-adjusted demand that takes into account the production structure of the economies. We again apply the estimated demand coefficients decomposed to subcomponents for the two crises to examine the importance of the service-sector demand in the trade collapses.

Following earlier literature (Aslam et al. 2018; Auboin & Borino 2017; Bussiere et al. 2013), we estimate a simple standard panel OLS regression for imports on the basis of (1) of the form:

$$\Delta lnM_{c,t} = \delta_c + \sum_{l=0}^{L} \beta_{D,l}\, \Delta lnD_{c,t-l} + \sum_{l=0}^{L} \beta_{P,l} \Delta lnP_{M,c,t-l} + \sum_{l=1}^{L} \beta_{M,l} \Delta lnM_{c,t-1} + \varepsilon_{c,t}, \qquad (5)$$

where Δ ln $M_{ct\text{-}l}$ is the quarterly change in the volume of imports of country *c*, δ_c is a country dummy, Δ ln D_t is the quarterly change in the import intensity adjusted aggregate demand of country *c*, $P_{M,c,t\text{-}l}$ is the import price index of country *c*, and $\varepsilon_{c,t}$ is the error term.

Our data are mainly taken from the OECD. We use quarterly seasonally-adjusted data for the volume of imports of goods and services, consumption, fixed capital formation and the volume of exports of goods and services.[2] For import prices we use the import deflators also available in the OECD National Accounts database.[3] Our sample covers 40 countries (29 advanced and 11 emerging economies according to the IMF classification) and the time period runs from 1Q1995 to 4Q2020. The panel is unbalanced, with the starting point of the data varying across countries from 1Q95 to 1Q04.

The data for import intensity of the demand components is calculated from the OECD Trade in Value Added (TiVA) database. The data are annual and cover 1995–2015. We use the annual shares across all quarters of the respective years and the shares of 2015 for the most recent years for which there is no data available yet. As an alternative demand measure, we use the volume of GDP that is also taken from the OECD database. The descriptive statistics on main variables are presented in the Appendix Table A2.

[2] Departing from Bussiere et al. (2013), we only use aggregate consumption and aggregate gross capital formation instead of dividing them further to private and government consumption and gross fixed capital formation and inventories. This is mainly due to the restricted data availability for emerging economies we include in the analysis. Earlier literature suggests that the role of government consumption in determining import development is marginal and thus it is not crucial to disentangle it. The role of inventories is important, so it is reasonable to include it in the estimations.

[3] The sole exception is China. As Chinese data are not included in the OECD Quarterly National Accounts database, we construct the data for China using an aggregate GDP figure from Macrobond and distributing it to demand components. In the distribution, we use the quarterly growth shares of demand components for 1Q15–4Q20 and the annual growth shares for the previous years provided by CEIC. The shares are assumed the same throughout all quarters. Chinese import prices are proxied by the export price index of the OECD countries taken from the OECD Quarterly National Accounts Database.

4.1 Baseline regression

First, we estimate the baseline regression according to (5), i.e. the change in imports is regressed on the change in demand and the change in import prices. We include first lags of the dependent and explanatory variables[4] and country fixed effects. The results from using GDP and IAD as the demand measure for the whole sample of 40 countries are presented in Table 1. As expected based on the results from previous literature, the fit of IAD is much better in explaining the import development than GDP. All variables are highly significant, and their magnitude is in line with expectations. The coefficients of the regressors in the IAD equation are also quantitatively close to the results obtained in Bussiere et al. (2013), despite different time periods and country coverage.

Table 1 Estimation results for change in imports using GDP and IAD as demand measures

Dependent variable: $\Delta \ln M_t$		
	D = GDP	D = IAD
Constant	0.00 (0.0009)	0.00 (0.0004)
$\Delta \ln D_t$	1.51*** (0.0846)	1.32*** (0.0591)
$\Delta \ln D_{t-1}$	0.60*** (0.0770)	0.33*** (0.0430)
$\Delta \ln P_{M,t}$	–0.17*** (0.0469)	–0.13*** (0.0402)
$\Delta \ln P_{M,t-1}$	–0.02 (0.0310)	0.02 (0.0405)
$\Delta \ln M_{t-1}$	–0.15* (0.0544)	–0.09* (0.0396)
Country fixed effects	yes	yes
R^2	0.39	0.66
N	3,872	3,872

Note: Robust standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

To check the robustness of our results, we apply also additional estimation methods. Following Aslam et al. (2018), we apply the mean group (MG) estimator shown to be consistent even with large N and T by Pesaran & Smith (1995). To address potential cross-sectional dependence, we follow Gregori & Giansoldati (2020) and use the common correlated effect mean group (CCEMG) estimator introduced by Chudik & Pesaran (2015).[5]

[4] Specification tests imply that one lag should be included in the model. This is also in line with Bussiere et al (2013). The results are very similar with two lags.

[5] Chudik & Pesaran (2015) show that the CCEMG estimator is valid even in panels with lagged dependent variable with certain conditions and that it performs well when the time series dimension is sufficiently large. The estimation results are, however, quite similar even if the lagged dependent variable is excluded.

These alternative estimations provide coefficients that are highly significant and quantitatively quite close to our baseline estimation (see Appendix Table A3 for details). This is in line with Martinez-Martin (2016). Aslam et al. (2018), however, find the MG estimator produces somewhat different coefficients than the pooled panel estimation. This might reflect differences in sample composition. Aslam et al. (2018) use annual data for much longer time period (1985–2016) and a much wider and more heterogeneous sample of over 150 countries. The coefficients reported by Aslam et al. (2018) and Martin-Martinez (2016) with the MG estimator are nearly identical to our results obtained from the pooled panel estimation. Moreover, the time series for some countries in our sample are quite short, which makes the use of MG and CCEMG estimators more uncertain. Therefore, we continue with the OLS panel formulation.

We next examine the evolution of the income elasticity of imports. If the elasticity declined after the GFC, the relatively milder trade collapse during the current crisis could just reflect lower income elasticity of imports. Following Bussiere et al. (2013) and Auboin & Borino (2017), we estimate equation (5) in 10-year rolling windows throughout the sample. We cannot identify any major structural break or a decline in the (contemporary) coefficient for IAD (Appendix Figure A1). In contrast, the coefficient shows a marginal *increase* over time from about 1.2 in the beginning of the period to about 1.4 in the last years of the sample. The result of a relatively stable development is in line with the findings of Bussiere et al. (2013) and Auboin & Borino (2017), as well as Ollivaud & Schwellnuss (2015). It contradicts the result of Martin-Martinez (2016) i.e. a structural change occurred during the GFC that led to a decline in the income elasticity of imports. None of the previous results suggests a rise in elasticity, but all previous studies use observation periods that end several years before ours.

Finally, we split the sample to advanced and emerging economies to see if there are systematic differences between advanced and emerging economies. That seems not to be the case, however. Table 2 shows that the coefficients are quite similar in magnitude, although slightly larger for the advanced economies. The coefficients are again very close to the estimates presented in Aslam et al. (2018), while Auboin & Borino (2017) reach fairly similar results. The findings of Gregori & Giansoldati (2020) also suggest that there are no major differences between the demand elasticity of imports across advanced and emerging economies. Applying the 10-year rolling windows for advanced and emerging economies separately shows that the evolution of the coefficients is quite similar for both country groups, but the coefficient for emerging economies is slightly more volatile (Appendix Figure A1).

Our results with the MG and CCEMG estimators suggest that there is some variation between countries, but it appears to apply to both advanced and emerging economies. The (contemporary) coefficients for IAD vary from the lows of 0.60 (MG) and 0.68 (CCEMG) in Japan and 0.86

and 0.91 in Brazil to 1.84 and 1.82 in Korea, respectively. This variation is in line with the results of Aslam et al. (2018) and several individual country coefficients are quantitatively close to those reported by Gregori & Giansoldati (2020) and Martin-Martinez (2016). Table 2 suggests that the IAD performs slightly better at explaining the import development in advanced economies than emerging economies, but this could reflect the quality of data and shorter time series available for most emerging economies. Moreover, our sample includes only 11 emerging economies due to the restricted data availability.

Table 2 Estimation results for the subsamples of advanced and emerging economies (using IAD as the demand measure)

Dependent variable: Δ ln M_t; D=IAD			
	All economies	Advanced economies	Emerging economies
Δ ln D_t	1.32*** (0.0591)	1.34*** (0.0748)	1.27*** (0.0620)
Δ ln D_{t-1}	0.33*** (0.0430)	0.38*** (0.0454)	0.29*** (0.0845)
Δ ln $P_{M,t}$	–0.13*** (0.0402)	–0.10* (0.0598)	–0.16** (0.0579)
R^2	0.66	0.69	0.60
N	3,872	2,930	942

Note: Robust standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01. All estimations include constant term, first lags of all variables and country fixed effects. Only results for main variables of interest, however, are reported in the table.

4.2 Contribution of demand and subcomponents to import collapse during the current crisis

In this section, we consider how well the IAD explains the import development during the covid-19 crisis and the contributions of various demand components in the same vein as Bussiere et al (2013) and Auboin & Borino (2017). We report the results calculated from our baseline regression with pooled fixed effects. These results, on average, are quite similar even if calculated using the country-specific coefficients obtained from MG and CCEMG estimations. The first columns of Table 3 present the change in import growth in 2Q20 and the percentage shares of import growth explained by import prices and the IAD, respectively. In the following columns, the IAD percentage is further decomposed into contributions of various demand components (with their contributions summing up to the total IAD contribution).

Table 3 Import growth decomposition for 2Q20 (for China 1Q20)

%-share of ΔM explained by						
	ΔM (%)	P_M	IAD total	*of which*		
				C	I	X
Advanced economies						
Australia	–13.1	–1.8	80.5	47.4	24.0	9.1
Austria	–17.3	–1.1	95.8	28.7	19.7	47.4
Belgium	–14.5	–3.3	125.6	34.1	40.3	51.1
Canada	–26.1	–1.0	82.4	32.8	29.6	20.0
Czech Rep.	–19.4	0.8	94.2	12.9	10.3	71.1
Denmark	–10.6	–2.7	96.9	21.3	20.4	55.2
Estonia	–16.6	–2.3	79.0	15.8	–1.2	64.4
Finland	–12.7	–6.8	75.1	40.3	2.3	32.5
France	–18.8	–2.3	109.4	47.0	17.2	45.2
Germany	–17.3	–2.4	90.6	29.5	10.5	50.5
Greece	–14.8	–8.7	145.6	58.8	12.8	74.0
Ireland	–44.4	1.2	69.7	8.6	56.8	4.3
Israel	–13.5	–4.3	107.8	43.7	42.8	21.3
Italy	–20.0	–3.7	107.4	35.9	24.2	47.3
Japan	–3.2	–2.2	33.9	18.0	3.8	12.2
Korea	–6.9	–11.2	124.2	–9.0	0.2	133.0
Latvia	–18.6	–1.2	68.5	55.9	–12.3	24.8
Lithuania	–18.1	–5.9	74.4	29.9	8.7	35.8
Netherlands	–9.9	–6.5	116.5	50.8	16.9	48.8
New Zealand	–28.3	1.0	75.0	23.6	39.2	12.3
Norway	–18.8	1.6	56.4	28.7	17.0	10.7
Portugal	–34.8	–1.7	82.9	24.0	5.7	53.1
Slovakia	–30.8	0.4	88.8	9.8	18.9	60.0
Slovenia	–24.1	–0.6	80.6	22.5	6.2	51.9
Spain	–33.7	–1.4	93.3	31.1	20.6	41.6
Sweden	–13.9	–2.7	77.4	25.6	2.3	49.6
Switzerland	–6.8	3.3	168.0	51.1	93.2	23.7
UK	–22.7	–0.3	137.1	85.5	41.8	9.9
US	–19.5	–2.3	73.5	35.9	22.6	14.9
AE average	*–18.9*	*–2.3*	*93.5*	*32.4*	*20.5*	*40.5*
Emerging economies						
Argentina	–19.8	1.3	129.9	77.6	47.3	5.0
Brazil	–12.6	6.7	118.1	73.9	45.6	–1.4
Chile	–12.7	–1.3	159.7	114.1	48.1	–2.5
China	–12.2	–0.4	111.6	33.7	47.8	30.1
Colombia	–34.3	2.7	99.0	31.4	59.7	7.8
Hungary	–18.7	–0.1	121.8	20.3	7.0	94.5
Indonesia	–8.0	–25.3	128.8	53.9	61.6	13.3
Mexico	–30.4	4.7	117.6	35.1	28.1	54.4
Poland	–20.3	–0.1	90.7	27.9	27.6	35.2
Russia	–5.5	–29.9	86.8	65.5	15.2	6.1
Turkey	–15.4	–6.0	113.1	34.6	19.2	59.3
EM average	*–17.3*	*–4.3*	*116.1*	*51.6*	*37.0*	*27.4*
All-country average	–18.5	–2.9	99.7	37.7	25.0	36.9

As Table 3 shows, the percentage of import growth explained by the IAD in general is very high (on average close to 100 %, and even exceeding 100 % for several countries). The contribution of

P_M is negative for the majority of countries. This implies that import prices tended to fall in 2Q20, which supports an increase rather than decrease in imports. These results suggest that the role of demand factors in the trade collapse was substantial, while supply factors played a more limited role. Taking a closer look on the contributions of various demand components shows that the largest contributions to import decline have come from consumption and exports (as illustrated by the grey cells in Table 3). The average percentage of import decline explained by consumption is 38 % and by exports 37 %.

There is much variation across countries regarding the main contributing component. In most countries, the decline has been either clearly consumption-led (e.g. Chile and the UK) or export-led (e.g. Korea and Hungary). There are a few countries with investment-led decline (most notably China) and other countries where the contributions of different components have been of similar magnitude.

There appears to be some differences between advanced and emerging economies. The contribution of demand factors is on average slightly higher in emerging countries than in advanced economies. In addition, the contribution of domestic demand components, particularly consumption, is higher on average in emerging economies. Correspondingly, the contribution of export demand is larger on average in the advanced economies. This could reflect the massive public sector support measures in advanced economies to boost domestic demand. According to the IMF database on fiscal measures in response to covid-19, the average amount of fiscal support (additional spending or foregone revenues) was 11 % of GDP in the advanced economies of our sample and 6 % of GDP in the emerging economies of our sample.

We still see considerable variation within country groups. Thus, differences between countries could reflect other characteristics. The relatively small sample size of 40 countries makes more detailed statistical analysis on the collapse difficult, but we can make some indicative comparisons. First, the import decline in the EU countries has been much more strongly export-led than in the other countries of the sample.[6] The average share of import decline attributable to exports is 49 % for the EU countries, while the average for other countries is only 24 %. This could reflect the relatively strong overall export-orientation of most EU countries and the high level of regional integration in Europe. This finding also comports with the results of Andersson et al. (2020) on the importance of external factors in the GDP contraction of the euro area.

Second, the contribution of exports to import decline appears to be higher in countries where the share of intermediate inputs in imports is higher (e.g. Korea and Czech Republic). In contrast, the contribution of exports tends to be smaller in countries that export more raw materials

[6] About half of the countries in our sample are EU members.

(e.g. Norway and Russia), as the import content of raw material exports is typically very low. The correlation of the share of exports in import decline with the share of intermediate inputs in imports is 0.60 and with the share of raw materials in exports –0.35 (scatter plots on these relationships are presented in the Appendix Figure A2). Finally, the import decline seems to have been more strongly consumption-led in those countries that have imposed stricter restrictive measures to contain covid-19 (Appendix Figure A3). The correlation between the consumption share in import decline and the Covid-19 Stringency Index is 0.34. In addition, stronger government support measures could be associated with less investment-led import decline, although the correlation is only –0.11.

4.3 Comparison of the current import collapse to the GFC

In this section, we compare the current crisis with the global financial crisis (GFC) of 2008–2009. We perform the same calculations for 1Q09, i.e. when most countries in our sample recorded the sharpest falls in imports, as for 2Q20 above. Table 4 presents the change in imports and the percentages of the change that are explained by import prices and the IAD in 1Q09 and in 2Q20 individually for selected countries and the (simple) average across advanced economies, emerging markets and all countries in the sample.

Table 4 Comparison of import growth decomposition in 1Q09 and 2Q20

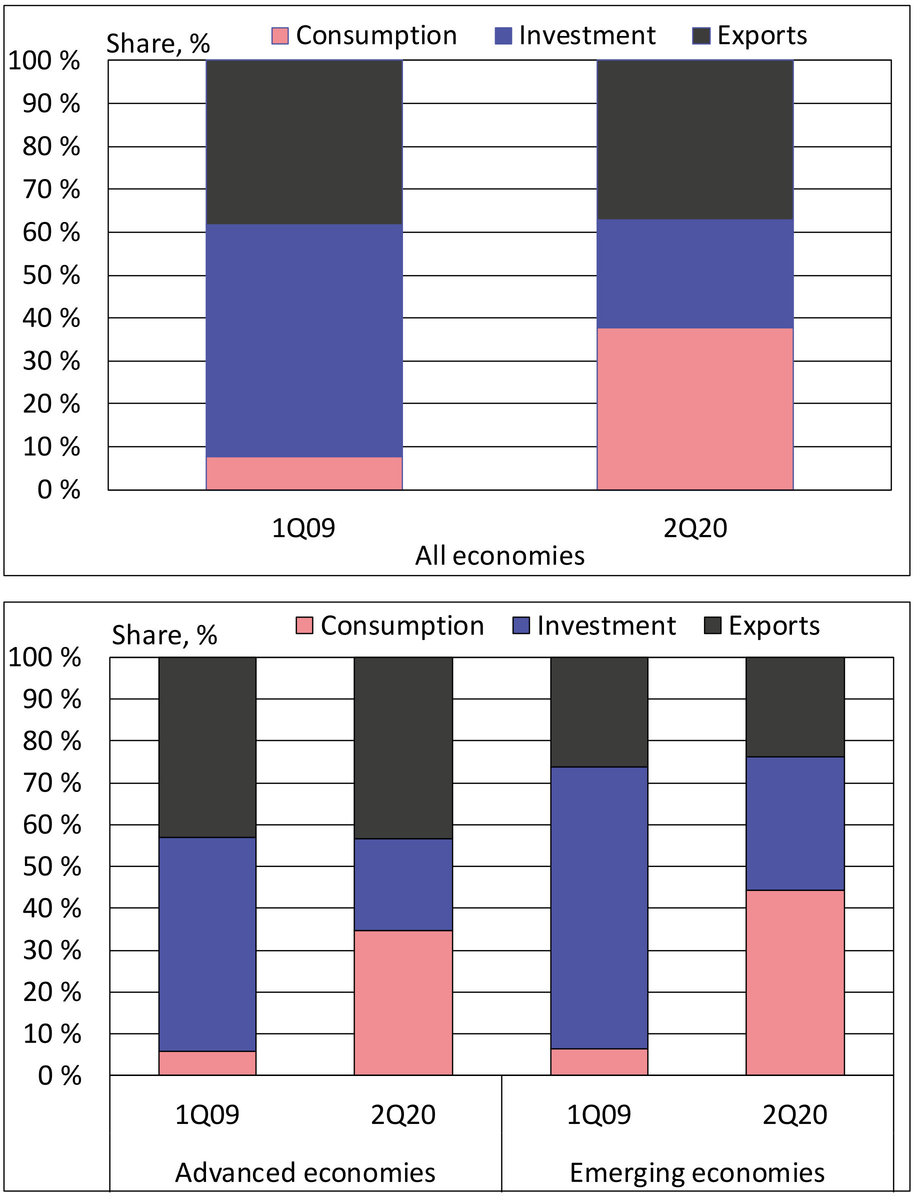
	1Q09			2Q20*		
	ΔM (%)	P_M	IAD total	ΔM (%)	P_M	IAD total
Canada	–10.2	–3.6	64.1	–26.1	–1.0	82.4
Germany	–6.1	–10.4	131.3	–17.3	–2.4	90.6
Finland	–8.2	–11.6	110.1	–12.7	–6.8	75.1
Korea	–7.0	–16.8	63.5	–6.9	–11.2	124.2
US	–10.4	–10.9	38.1	–19.5	–2.3	73.5
Brazil	–15.4	–12.8	30.8	–12.6	6.7	118.1
Poland	–16.0	10.6	20.5	–20.3	–0.1	90.7
Russia	–31.3	7.1	42.1	–5.5	–29.9	86.8
Turkey	–7.8	–5.5	120.3	–15.4	–6.0	113.1
China	–20.2	–1.7	49.7	–12.2	–0.4	111.6
AE average	*–10.2*	*–4.8*	*72.4*	*–18.9*	*–2.3*	*93.5*
EM average	*–13.9*	*–6.7*	*53.4*	*–17.3*	*–4.3*	*116.1*
All-country average	–11.2	–5.3	67.2	–18.5	–2.9	99.7

* 1Q20 for China

The IAD explains on average a larger percentage of import decline during the covid-19 crisis than during the GFC. The contribution of import prices is negative in both periods, but slightly higher in 1Q09. Comparison of advanced and emerging economies shows that in 1Q09 the IAD explained a larger percentage of import decline on average in advanced economies, while the opposite was true in 2Q20. This could reflect the fact that the GFC hit many emerging economies less hard than the current crisis. While there is large variation across individual countries, the IAD explains in the majority of cases as high or higher percentage of import decline in 2Q20 than in 1Q09.

Comparing the contributions of demand components shows substantial differences between the crisis periods. While the import decline in 1Q09 was mainly investment-led, the contribution of consumption was much higher in 2Q20. Since the total percentage explained by the IAD varies between crisis, we compare the relative contributions of demand components (i.e. their shares sum up to 100) in Figure 1. In 1Q09, the share of consumption in the total explanatory power of the IAD was only 6 %, but in 2Q20 it was 38 %. The corresponding shares for investments are 55 % in 1Q09 and 25 % in 2Q20, and for exports 39 % in 1Q09 and 37 % in 2Q20.

Figure 1 Average relative contributions of demand components to the import declines of 1Q09 and 2Q20



Note: The shares represent (unweighted) averages calculated across the countries in the sample and normalized to sum up to 100.

As illustrated in Figure 1, the main difference between the crises in both advanced and emerging economies is the change in the contribution of domestic demand components. The contribution of exports remains similar. Individual country-level examination gives a similar picture. In 1Q09, the import decline was investment-led in the majority of countries, while in 2Q20 consumption-led and export-led declines were more prominent. In about half of the countries either domestic demand or exports was the main factor explaining import decline during both crises, while in the other half the main factor was different during the crises. Exports appear to be a particularly important factor for EU countries in both crises (as discussed above for the covid-19 crisis).

4.4 Comparison of import recoveries during the current crisis and the GFC

Despite a sharp decline in 2Q20, imports recovered rapidly in most of the countries of our sample. As our dataset runs to the end of 2020, we can examine the initial recovery pattern of imports during the current crisis and make comparisons to 2009. The timing and duration of import decline and recovery varies across countries in both crises. For illustrative purposes, we focus on the recovery period of 2Q–4Q09[7] and 3Q–4Q20[8].

Our first general observations are that the import recovery has been faster overall in our sample countries, but also more heterogeneous during the current crisis than during the GFC. In 4Q09, the average level of imports was only 5 % higher compared to the trough of 1Q09. In 4Q20, it was already 16 % higher compared to the trough of 2Q20. The variation across countries is also much higher during the current crisis.

Table 5 shows the realized level of imports and the level predicted by the IAD during both crises for selected countries. In general, the in-sample predictions based on IAD are relatively close to the realized outcomes, but for certain countries differences are larger. For most countries, the IAD predictions would have suggested an even slightly faster recovery in imports during the current crisis than was realized (illustrated in Table 5. with the darker grey cells). In contrast, during the GFC the IAD predictions tended to underestimate the recovery in imports (illustrated in Table 5 with the lighter grey cells). This could imply that supply factors have restricted the recovery more during the current crisis than during the GFC.

[7] On average, the imports were still on the decline in 2Q09. However, the decline had already moderated and recovery was underway in several countries.

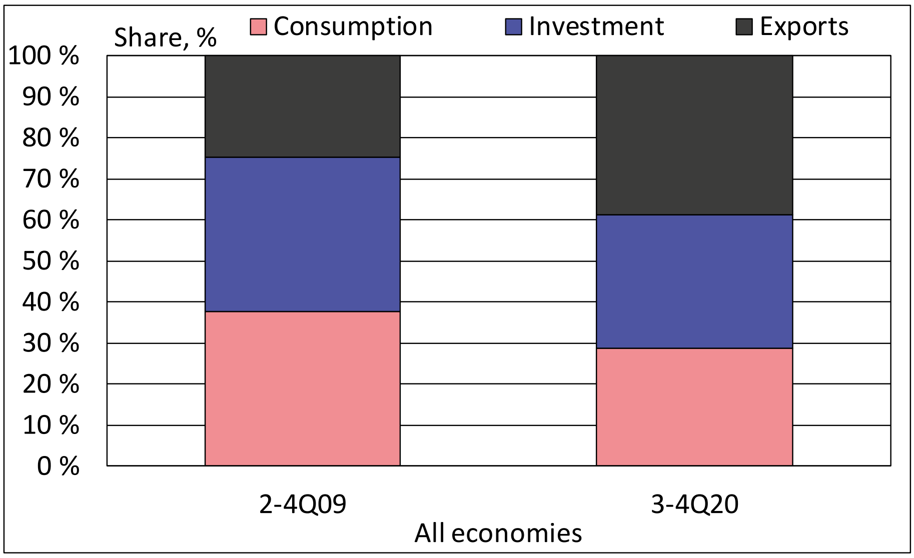
[8] In China's case, we use 2Q20–3Q20 as the crisis hit earlier.

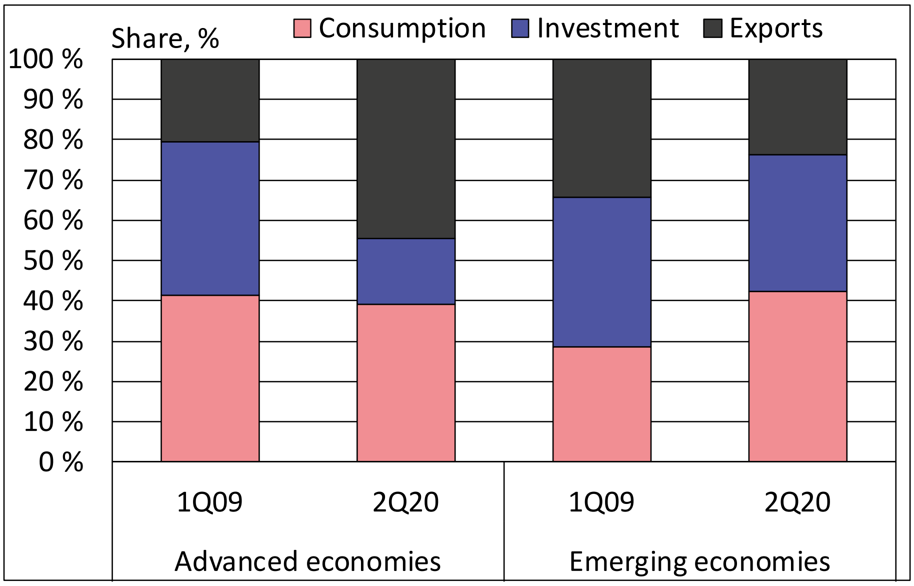
Table 5 Comparison of realized level of imports and the level predicted by demand changes for selected countries in 4Q09 and 4Q20

	4Q09 (100=1Q09)			4Q20 (100=2Q20)		
	M	IAD	Ratio (pred./real.)	M	IAD	Ratio (pred./real.)
Canada	108.5	105.3	0.97	122.6	128.8	1.05
Germany	97.6	102.1	1.05	112.6	113.8	1.01
Finland	97.1	103.2	1.06	103.8	102.4	0.99
Korea	121.1	109.7	0.91	107.8	109.9	1.02
US	104.4	103.4	0.99	124.0	131.5	1.06
Brazil	122.6	109.5	0.89	107.7	101.4	0.94
Poland	110.1	104.8	0.95	126.3	137.0	1.08
Russia	112.7	107.3	0.95	95.9	92.2	0.96
Turkey	119.1	105.9	0.89	124.9	138.2	1.11
China	113.0	111.6	0.99	111.9	114.9	1.03
Average	105.1	103.7	0.99	116.1	118.9	1.02
Std. dev.	7.2			10.5		

Next, we decompose the recovery periods to demand components in a similar manner than for the crisis periods above. As Figure 2 shows, the recovery in 2009 on average was led by domestic demand. In 2020, the contribution of exports to the recovery was much larger. This reflects the development in advanced economies, whereas in emerging economies the contribution of export demand has actually been slightly smaller during the current recovery than after the GFC. In most countries, the 2020 recovery has been led by the same demand component as the preceding decline (e.g. in a country where the import collapse was mainly due to consumption, the import recovery was also led by consumption). The 2009 import recovery was quite different for most countries, however. While the import collapse was investment-led in most countries, the recovery was usually led by consumption. This is illustrated by the strong drag in some countries in 2009 caused by investment trends. The recoveries also reflect the rapid rollout of massive support measures during the current crisis to prevent a financial market crash similar to the one that occurred in 2009.

Figure 2 Average relative contributions of demand components to the import recovery in 2–4Q09 and 3–4Q20





Note: The shares represent (unweighted) averages calculated across the countries in the sample (excluding certain outliers) and normalized to sum up to 100.

4.5 Significance of an economy's production structure for import development

Finally, we examine the demand component effects arising from the economic production structure to complement the picture. Given that import intensity of production tends to vary substantially across production sectors, this could be an important factor. The final demand in manufacturing and primary sectors is typically more heavily oriented to imports than final demand in the service sector and construction (see Appendix Table A4). The current crisis has hit the service sector particularly hard with the strict restrictions imposed e.g. on gathering and movement of people. This could also be reflected in the milder contraction in trade than in GDP as service sector demand is less import-intense.

To examine this issue, we perform similar exercises as above with an IAD measure that takes into account the import intensity of the main production sectors (agriculture, industry other than manufacturing, manufacturing, construction and services). We construct the IAD measure similarly as above utilizing again data mainly from the OECD.[9] The data sample covers again the time period from 1Q95 to 4Q20, but country coverage is limited to 32 due to lack of data. We first estimate equation (5) using this new IAD2 measure. The results, reported in Table 6, show that the performance of this demand measure is poorer in terms of fit, compared to GDP and especially the traditional IAD measure.

Table 6 Estimation results using GDP, IAD and IAD 2 as demand measures

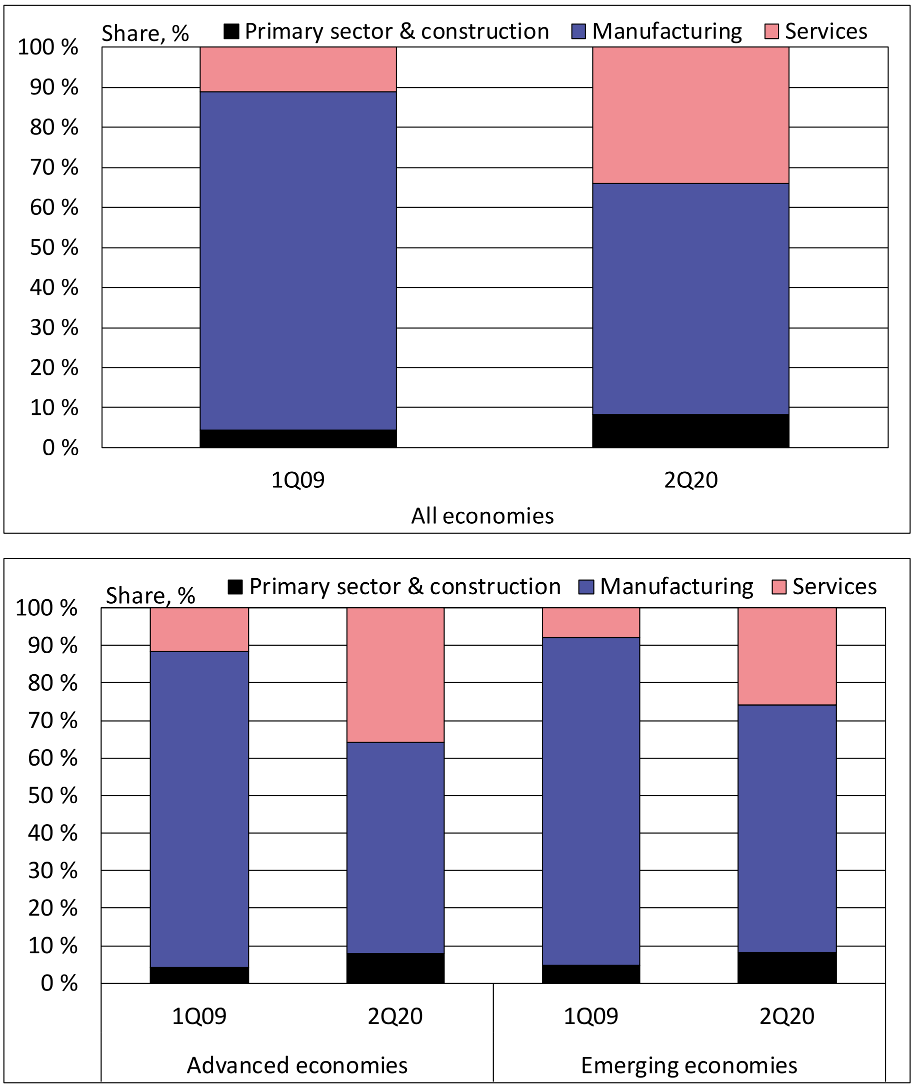
Dependent variable: $\Delta \ln M_t$			
	D=GDP	D=IAD	D=IAD2
$\Delta \ln D_t$	1.58*** (0.0650)	1.28*** (0.0483)	0.93*** (0.0680)
$\Delta \ln D_{t-1}$	0.54*** (0.0798)	0.35*** (0.0416)	0.28*** (0.0503)
$\Delta \ln P_{M,t}$	–0.19*** (0.0565)	–0.15*** (0.0496)	–0.18** (0.0693)
R^2	0.45	0.65	0.30
N	3,116	3,116	3,116

Note: Robust standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01. All estimations include constant term, first lags of all variables and country fixed effects, but only results for main variables of interest are reported in the table.

Nevertheless, more detailed examination of sector contributions can reveal interesting patterns related to the crises. Therefore, we decompose the import decline during the crisis into sector contributions in a manner similar as for the demand components above. Although manufacturing sector accounted for the majority of the import decline in 2Q20, the service sector also had a significant contribution (Figure 3). The contribution of the manufacturing sector was nevertheless still notably higher in the import collapse of 1Q09, while the role of service sector was correspondingly much smaller. This picture is similar for both advanced and emerging economies, but the contribution of the service sector is higher for advanced economies. This highlights the unique nature of the covid-19 crisis compared to the previous crises in its strong focus on the service sectors. It could also be a factor behind the relatively mild trade contraction in comparison to GDP during the current crisis.

9 Data for China are constructed similarly as described above based on data from Macrobond and CEIC. Data for Russia are taken from Russia’s national statistical office Rosstat.

Figure 3 Average relative contributions of aggregate sectors to the import decline in 1Q09 and 2Q20



Note: The shares represent (unweighted) averages calculated across the countries in the sample and normalized to sum up to 100.

5 Conclusion

Global trade declined sharply during the most intense phase of the ongoing covid-19 crisis. While the decline as such was similar in magnitude to that of the GFC in 2009, it was milder in relation to the decline in GDP. Our analysis suggests that, as with the GFC, demand – particularly the composition of demand – was an important factor behind the latest trade collapse. We find no support for the notion of lower demand elasticity of imports suggested in in certain recent studies. When adjusted for import intensity, changes in demand explain quite well the contraction in imports during the most intense phase of the covid-19 crisis in 2Q20.

Our analysis illustrates the different role of demand components in the current crisis compared to the GFC. In 2009, the import collapse was clearly investment-led in the majority of sample countries. In 2020, consumption had a particularly large contribution to declining imports in several countries. This shift was also reflected in the production side of the economy as the covid-19 crisis has hit particularly hard the service sector. Our experiments with a novel import-intensity-adjusted demand measure suggest that in the current crisis the contribution of service sector demand to the trade collapse has been much larger than during the GFC. This may help explain the relatively moderate trade contraction in relation to GDP. The service sector, which accounts for a large share of GDP in most countries, is typically less import-intense than the manufacturing sector.

Finally, we find differences when comparing the recovery of imports during the two crises. In 2009, the recovery was slow and relied heavily on domestic demand. The 2020 recovery was swift and export-led – at least in advanced economies. This suggests that the quickly deployed stimulus measures of advanced economies supported domestic production that had supportive spillover effects throughout the global network of production. It also illustrates the importance of refraining from overly protectionist policies for the recovery of the global economy.

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Appendix – Tables and figures

Table A1 Import intensity of sample countries for demand components (2015)

	Consumption	Investment	Exports
Austria	27.0	42.0	26.5
Argentina (EM)	9.9	19.2	6.9
Australia	14.8	25.9	11.6
Belgium	31.8	49.4	34.1
Brazil (EM)	11.0	19.4	12.5
Canada	22.0	33.4	21.2
Chile (EM)	23.3	32.9	15.1
China (EM)	9.6	16.7	17.3
Colombia (EM)	16.1	30.2	11.6
Czech Rep.	33.7	49.1	39.3
Denmark	24.9	37.6	29.3
Estonia	35.3	51.3	34.8
Finland	23.0	36.1	25.9
France	19.7	27.3	21.4
Germany	21.1	28.2	21.0
Greece	19.8	43.9	24.5
Hungary (EM)	36.0	59.9	43.1
Indonesia (EM)	14.8	23.2	12.9
Ireland	41.4	60.3	40.2
Israel	16.7	30.0	18.6
Italy	18.5	26.8	22.2
Japan	13.1	19.0	13.2
Korea	20.9	32.4	32.6
Latvia	30.0	40.8	22.4
Lithuania	36.7	40.2	31.6
Mexico (EM)	20.0	29.9	36.1
Netherlands	25.8	39.8	27.9
New Zealand	18.2	29.7	13.8
Norway	21.1	30.4	13.9
Poland (EM)	27.1	42.4	26.6
Portugal	25.1	37.7	28.4
Russia (EM)	15.1	21.4	10.8
Slovak Rep.	35.5	55.8	44.8
Slovenia	32.7	45.6	32.5
Spain	19.0	32.3	22.7
Sweden	21.3	36.4	20.7
Switzerland	24.2	45.1	24.6
Turkey (EM)	16.3	27.9	16.8
UK	19.9	25.2	15.1
US	10.2	16.5	9.5
Average	22.6	34.8	23.3

Source: OECD TiVA database.

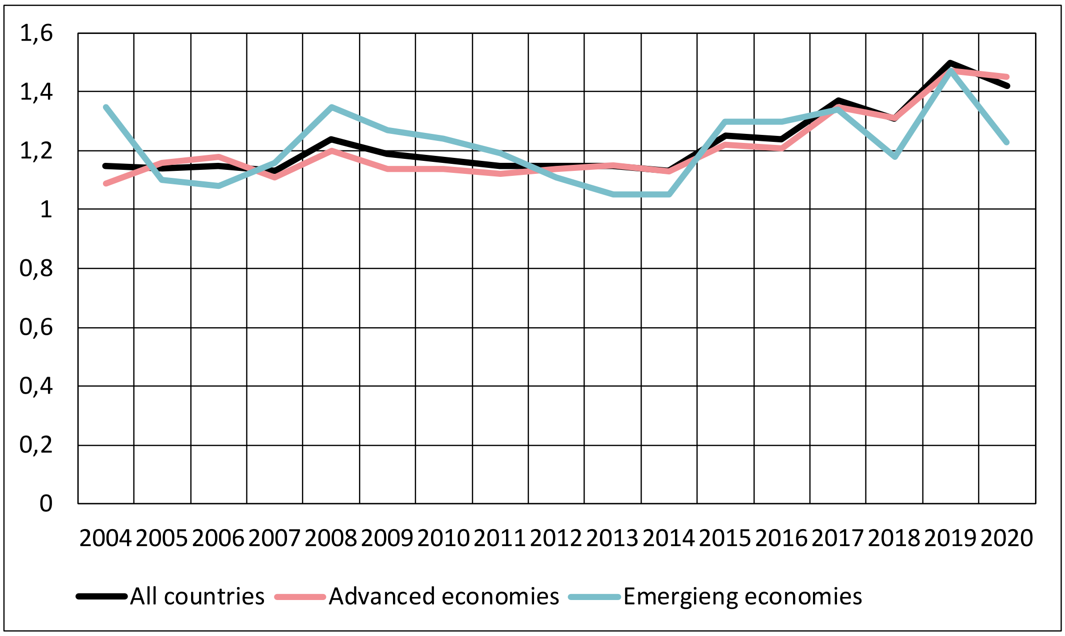
Table A2 Descriptive statistics

	Δ ln M	Δ ln P_M	Δ ln IAD	Δ ln GDP	Δ ln IAD2
Mean	1.20	0.80	0.64	0.58	0.70
Standard deviation	4.91	3.04	1.99	3.59	2.72
Correlation with **M**	1.00	–0.10	0.79	0.57	0.51
Correlation with $\mathbf{P_M}$	–0.10	1.00	–0.01	0.03	0.02
Correlation with **IAD**	0.79	–0.01	1.00	0.76	0.63
Correlation with **GDP**	0.57	0.03	0.76	1.00	0.77
Observations	3,872	3,872	3,872	3,872	3,116

Table A3 Comparison of the coefficients of IAD and import prices by using pooled fixed effects, mean group estimation (MG) and common correlated effects mean group estimation (CCEMG)

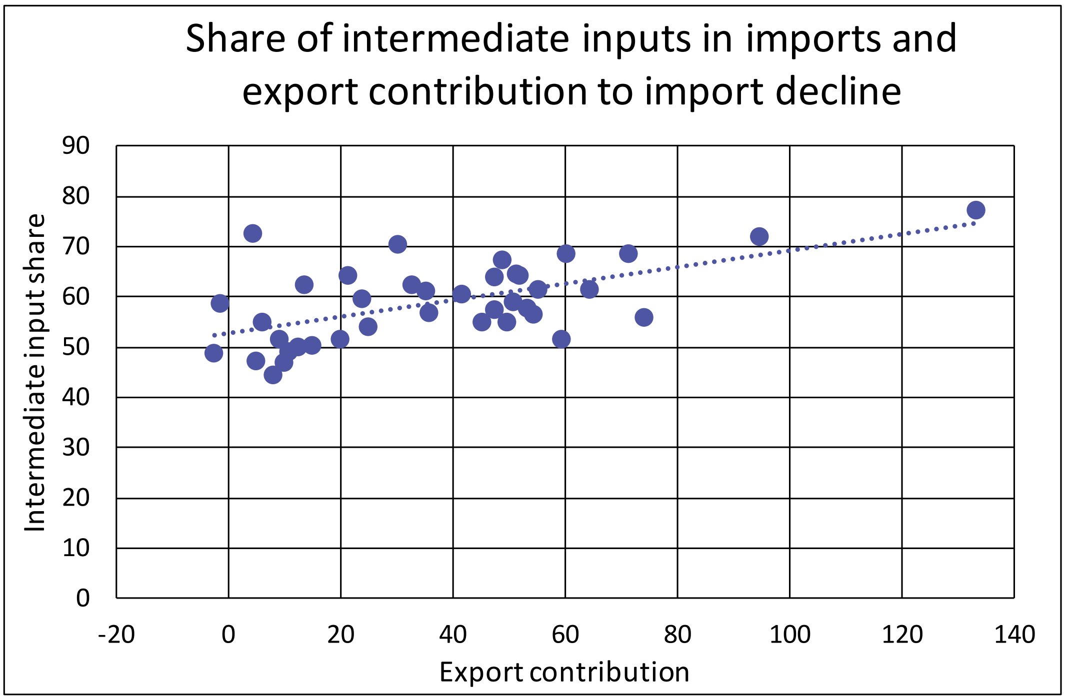
	Pooled FE	MG	CCEMG
Δ ln D_t	1.32 (0.0591)	1.29 (0.2548)	1.30 (0.2419)
Δ ln $P_{M,t}$	–0.13 (0.0402)	–0.09 (0.2379)	–0.09 (0.2416)

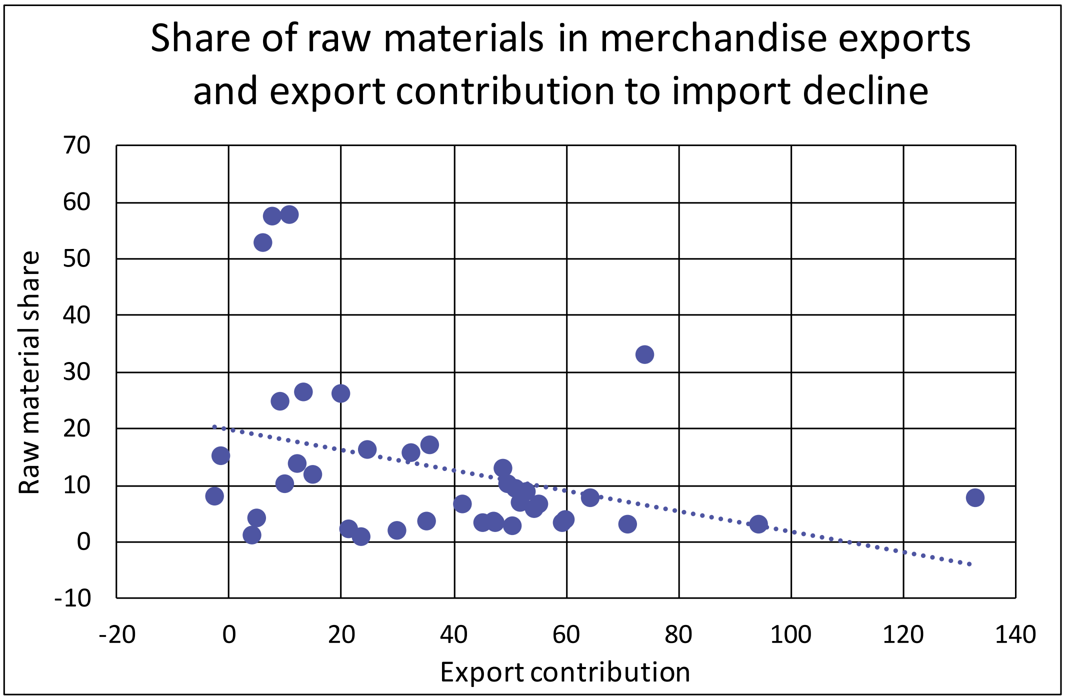
Figure A1 Evolution of import elasticity with respect to IAD over time



Note: The figure reports the evolution of contemporaneous coefficients of IAD estimated using panel regression of the form (5) with ten-year rolling windows. The number of countries included in the analysis is reduced to 35 due to much shorter time series available for certain emerging economies. All 29 advanced economies are included, but only six emerging economies.

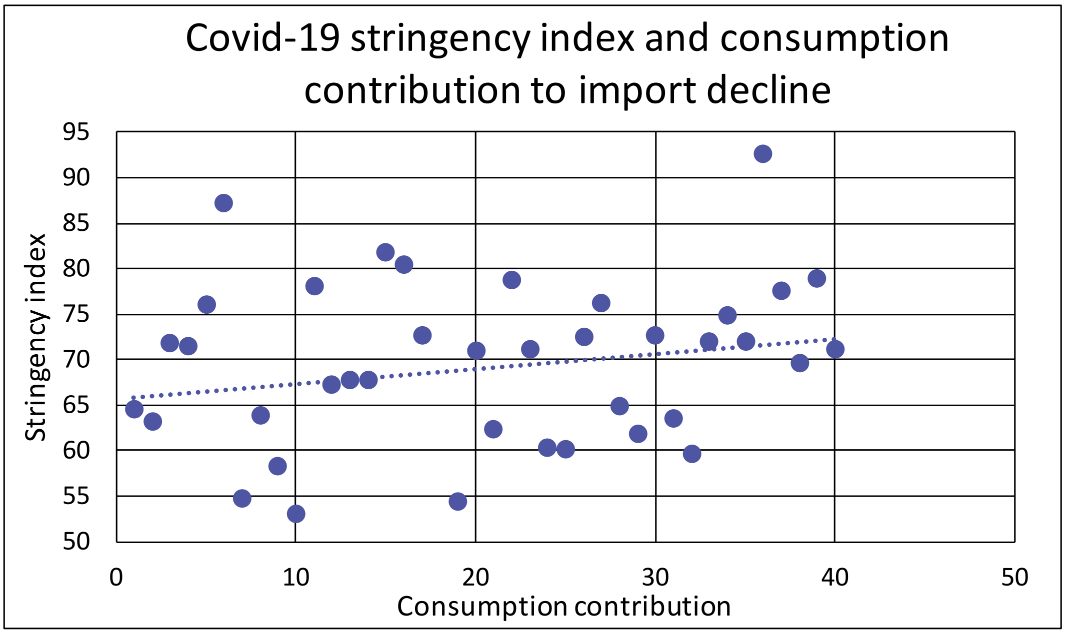
Figure A2 Scatter plots on the relationship of the contribution of exports in the import decline in 2Q20 and the share of intermediate inputs in imports and the share of raw materials in exports

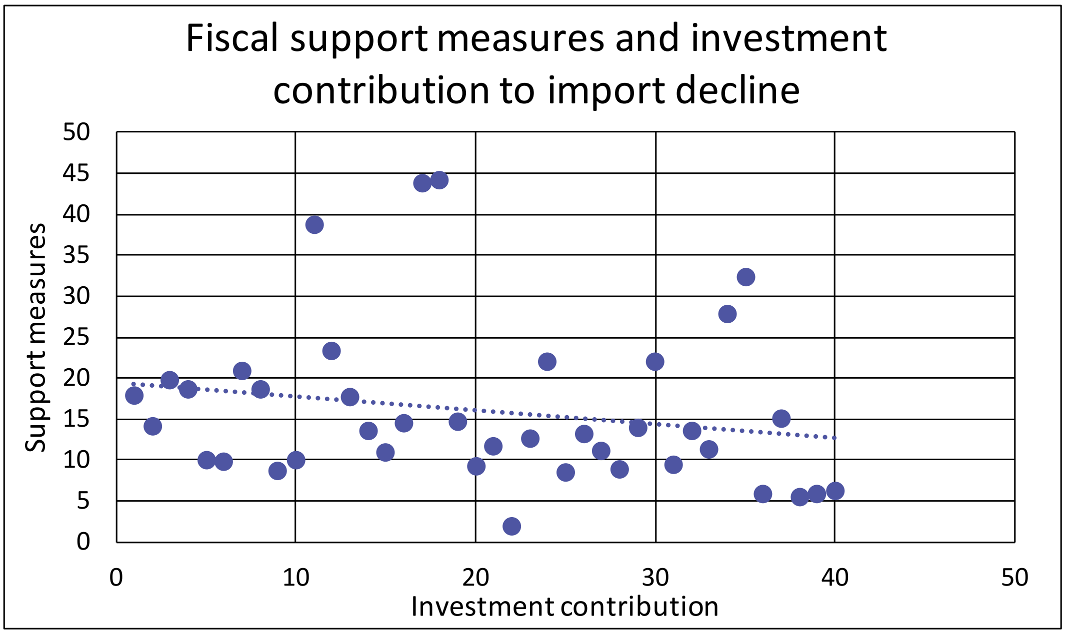




Note: The intermediate input share in imports is calculated from the OECD TiVA data for 2015 (latest year available). The share of raw materials in merchandise exports is calculated from the World Bank's World Development Indicators and covers fuels and agricultural raw materials.

Figure A3 Scatter plots on the relationship of the contribution of consumption in import decline in 2Q20 and the Covid-19 Stringency Index and the contribution of investment in import decline and the magnitude of fiscal support measures





Note: The Covid-19 Stringency Index is calculated as the average for 2Q20 from the daily database compiled by the Oxford University. The magnitude of fiscal support measures (% of GDP) is from the IMF and covers both above-the-line measures and liquidity support.

Table A4 Import intensity of sample countries for aggregate sectors of the economy (2015)

	Agriculture	Industry excl. manufacturing	Manufacturing	Construction	Services
Austria	52.7	57.9	61.2	4.3	25.0
Argentina	24.4	35.1	60.3	1.0	12.6
Australia	72.5	63.5	66.0	5.3	32.0
Belgium	9.5	32.0	29.4	1.0	9.7
Brazil	41.6	41.4	58.0	1.0	20.0
Canada	27.6	50.1	58.3	1.4	17.1
Chile	7.5	33.8	17.9	1.1	12.3
China	13.7	35.3	44.4	1.0	14.5
Colombia	45.4	50.2	67.0	6.0	31.1
Czech Rep.	58.0	48.9	60.0	4.7	23.1
Denmark	51.5	48.8	75.6	5.7	33.9
Estonia	32.4	48.6	50.6	3.3	22.0
Finland	34.7	52.9	57.3	3.3	16.3
France	64.9	52.7	40.5	4.0	18.9
Germany	23.6	52.1	57.6	7.5	15.2
Greece	31.0	64.6	72.4	8.4	33.3
Hungary	30.5	56.5	42.8	3.1	14.2
Italy	31.9	64.9	38.0	2.1	18.8
Korea	47.5	52.7	70.0	4.8	25.0
Latvia	48.8	64.8	63.6	5.7	31.0
Lithuania	57.7	62.2	58.0	4.4	25.3
Netherlands	26.4	40.2	52.9	2.2	15.8
New Zealand	42.4	26.9	64.6	3.1	22.2
Norway	36.6	39.4	57.0	3.2	24.5
Poland	46.4	53.0	62.5	5.5	19.2
Portugal	21.8	21.1	40.7	1.7	15.1
Russia	41.5	59.1	77.4	5.0	31.9
Slovak Rep.	48.0	58.0	67.4	5.4	27.8
Slovenia	34.6	50.2	49.8	2.6	15.7
Spain	42.5	46.9	53.5	3.8	21.9
Sweden	12.6	50.8	43.2	1.6	16.0
Turkey	53.1	42.6	57.0	2.2	16.0
UK	37.9	48.7	55.5	3.6	21.2
Average	52.7	57.9	61.2	4.3	25.0

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