Firm responses to Covid-shock: evidence from the Netherlands

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Happy King's day!

Overview

– Firm-level adjustment in trade (Mounir ea)

– Firm-performance and financial support (Creemers ea)

– Microdata infrastructure

Firm-level adjustment in trade

Introduction

Research question

- Covid-shock negatively affected international trade, followed by recovery

- How did the adjustment of trade look across phases of the pandemic

- And are there differences according to firm size, type of trader, government support, situation in partner countries, etc?

Data (2019-2021):

- International trade in goods statistics (quarter*product*partner country)
- Business Demography Statistics (firm characteristics)
- Corona government support data linked to Business Register

Trade pattern across phases of the crisis

Estimation approach:

- D_{kj} = {Shock (Apr-Sep 2020), Recovery (Oct 2020-Mar 2021), Growth (Apr 2021-Jun 2021}

- Perennial traders: log-linear panel data model

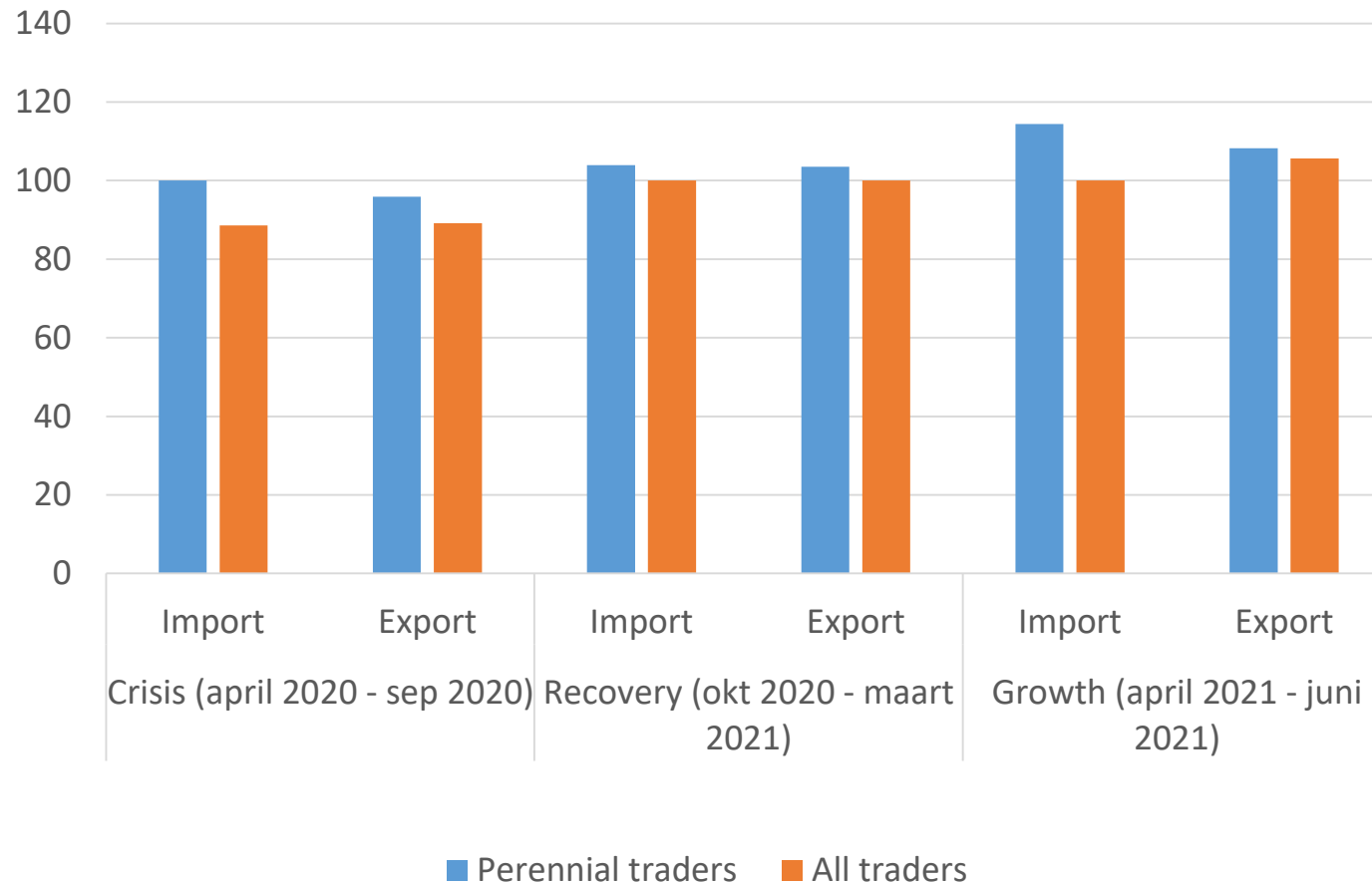$$Y_{ikjpl} = \beta_0 + \beta_{kj}D_{kj} + \alpha_i + \theta_j + \gamma_p + \delta_l + \varepsilon_{ikjpl}$$

- All traders: Pseudo Poisson Maximum Likelihood (PPML)

$$Y_{ikjpl} = \exp\left[\beta_0 + \beta_{kj}D_{kj} + \alpha_i + \theta_j + \gamma_p + \delta_l\right]\varepsilon_{ikjpl}$$

(i = firm; k = quarter; j = year ; p = product ; l = region)

Trade across phases of the crisis

Pre-crisis = 100

- Trade **fell back in Crisis period**,
- ... especially when occasional traders are considered
- But in fact not so much for perennial traders

- Trade **recovered and grew further** soon afterwards,
- ... especially for perennial traders

So: a **shift in trade** shares during pandemic towards perennial traders

Heterogeneity across firm characteristics

Estimation approach:

- Perennial traders (log-linear panel data model)

$$Y_{ikjpl} = \beta_0 + \beta_{1kj}D_{kj} + \beta_2 \, Z_{ikj} + \beta_3 \, Z_{ikj} \, D_{kj} + \beta_4 \, X_{ikj} + \rho_{ind} + \theta_j + \gamma_p + \delta_l + \varepsilon_{ikjpl}$$

- All traders (PPML)

$$Y_{ikjpl} = \exp\left[\beta_0 + \beta_{1kj}D_{kj} + \beta_2 \, Z_{ikj} + \beta_3 \, Z_{ikj} \, D_{kj} + \beta_4 \, X_{ikj} + \rho_{ind} + \theta_j + \gamma_p + \delta_l\right] \varepsilon_{ikjpl}$$

(Z_{ikj} is firm characteristic; X_{ikj} any other control in the specification)

Heterogeneity across size class

5.2 Size class and trade performance during the pandemic: regression output

	All exporters	Perennial exporters	All importers	Perennial importers
	%			
Independent SME (dummy)	–83,0***	–45,7***	–87,3***	–71,2***
Crisis (April 2020 – Sep 2020) X SME	10,1***	–1,1	16,4***	–4,0***
Recovery (Oct 2020 – Mar 2021) X SME	–0,3	–5,5***	10,6***	0,07
Growth (April 2021 – June 2021) X SME	2,4	–0,1***	20,8***	–0,03*

***p<0,01;**p<0,05;*p<0,1

SMEs trade less overall; this difference is somewhat smaller for perennial traders

I. Overall, exporting SMEs less affected in the crisis
II. Perennial SME exporters were hit equally hard strong during crisis, but they recovered less well
III. Similarly, importing SMEs were hit less hard, and recovered better
IV. Perennial importing SMEs were hit a bit harder, and also recovered slightly less well

The results suggest *a differential role of occasional SME traders*

Heterogeneity across type of good

8.5 Product types and trade during phases of the pandemic

	PPML Exporters (All)	Log-linear Exporters (Perennial)	PPML Importers (All)	Log-linear Importers (Perennial)
Product sort: Capital goods as baseline				
Intermediate goods	0.559***	0.270***	0.882***	0.541***
	(0.194)	(0.0347)	(0.145)	(0.0253)
Consumption goods	0.266	-0.196***	0.315***	0.131***
	(0.209)	(0.0485)	(0.106)	(0.0324)
Interaction Coronadummy X Product sort: pre-crsis X apital goods as baseline				
Crisis X Intermediate goods	-0.0412	0.0260	0.00685	0.0465**
	(0.0420)	(0.0202)	(0.0531)	(0.0191)
Crisis X Consumption goods	0.0803**	0.0985***	0.155***	0.0917***
	(0.0368)	(0.0255)	(0.0554)	(0.0218)
Recovery X Intremediate goods	-0.0626**	0.0223	-0.0680	-0.0452**
	(0.0303)	(0.0211)	(0.0497)	(0.0195)
Recovery X Consumption goods	-0.0653*	0.0323	-0.0154	-0.0237
	(0.0337)	(0.0260)	(0.0400)	(0.0225)
Growth X Intermediate goods	0.0346	-0.0119	0.0931	-0.0112
	(0.0400)	(0.0260)	(0.0856)	(0.0233)
Growth X Consumption goods	0.0384	0.0444	0.0774	0.00961
	(0.0383)	(0.0323)	(0.0593)	(0.0274)

Standard errors in parentheses - * $p<0.10$ ** $p<0.05$ *** $p<0.01$

Traders in consumption goods benefitted from crisis … temporarily as recovery of consumption goods export fell back (but not for perennial exporters)

Some evidence that traders in intermediate goods recovered less quickly

Complex pattern: but message is that there are significant differences between type of goods and traders, especially in the early phases of the crisis

Heterogeneity across partner countries

3.1 Regression results export and import value in the macromodel

	Log export value – All partners	Log import value – All partners	Log export value – Top-10 partners	Log import value – Top-10 partners
Covid-19 cases (log)	–0,007	–0,034	–0,019**	–0,012***
Covid-19 deaths (log)	–0,007*	–0,027	–0,017***	–0,013***
Stringency index	–0,005***	–0,006**	–0,004***	–0,003***
Vaccinations in t-1 (cumulative) (log)	0,009***	0,007	0,007***	0,009***
N	7 200	7 200	574	574

***p<0,01;**p<0,05;*p<0,1

Bilateral trade flows impacted significantly by Covid-situation in the partner country
… especially with most important trading partners

Severity of health situation and stringency of control measures have a significant negative effect
… where as vaccination rate has a positive effect

These results imply a heterogeneous impact across firms, conditional on countries in their trade portfolio

Government support and trade recovery by type of trader

	Exporters (All)	Exporters (Perennial)	Importers (All)	Importers (Perennial)
Received government aid dummy	-0.252**	-0.00560	-0.331***	0.0497***
	(0.116)	(0.0250)	(0.103)	(0.0169)
Interaction Corona dummy X government aid				
Recovery X Received aid	0.0118	0.0177	0.0375	-0.00248
	(0.0342)	(0.0145)	(0.0336)	(0.00996)
Growth X Received aid	-0.00996	0.0447**	0.0284	-0.00712
	(0.0428)	(0.0182)	(0.0596)	(0.0132)

Standard errors in parentheses - * p<0.10 ** p<0.05 *** p<0.01

- Overall supported firms seem to have traded less.
- Probably these firms are heavily affected and do not manage to remain internationally active, or have to scale back these operations.
- However, support seems to have helped mainly perennial traders, and there was actually a shift towards supported firms.
- And knowing that perennial firms are the bulk of the trade, this also suggests that government support helped in maintaining and recovering the levels of trade.

Firm-performance and Covid-19 financial support

Introduction

- Research question:
  - How was Covid-support package distributed
    - Across pre-pandemic firm productivity and investment
    - Investment during pandemic, and investment expectations
    - Firm exit

- Data (2019-2021):
  - Production Statistics (SBS, 2019)
  - Business Demography Statistics
  - Corona government support data

Types of support

Temporary Emergency Bridging Measure for Sustained Employment

The Temporary Emergency Bridging Measure for Sustained Employment (in Dutch: Noodfonds Overbrugging Werkgelegenheid, NOW) has been created for employers who, as a result of the coronavirus pandemic, are faced with an (expected) loss of turnover of at least 20% in various application periods. The NOW provides financial help for employers to pay their employees' wages in regard to the Covid-19 crisis (CBS, 2022a; Government of the Netherlands, 2020). NOW data is obtained from the Netherlands Employees Insurance Agency (UWV).

The Reimbursement Fixed Costs Scheme

The Reimbursement Fixed Costs Scheme (in Dutch: Tegemoetkoming Vaste Lasten, TVL) for SMEs aims to compensate SMEs in selected sectors for fixed costs other than wage costs. Entrepreneurs with loss of turnover as a result of the Covid-19 measures were able to make use of the TVL under certain conditions. Entrepreneurs can apply for TVL at the Netherlands Enterprise Agency (RVO) (CBS, 2022a; Government of the Netherlands, 2020). TVL data is obtained from Netherlands Enterprise Agency (RVO).

Direct compensation for entrepreneurs in affected sectors

The Direct compensation for entrepreneurs in affected sectors (in Dutch: Tegemoetkoming ondernemers getroffen sectoren, TOGS) is an arrangement for entrepreneurs who are affected by Dutch government measures taken to reduce the spread of the coronavirus pandemic. Under this arrangement entrepreneurs can receive a one-off compensation (CBS, 2022a; Government of the Netherlands, 2020). TOGS data is also obtained from RVO.

**Relaxed rules with respect to the payment of taxes and reduced fines**

Until the end of 2021, the Dutch Tax and Customs Administration offers a number of measures and possibilities for payment extensions to help businesses and employers during the coronavirus pandemic. The deferment of payment applies to income tax, corporation tax, payroll tax and value-added tax (VAT). Any fines that may be imposed for the late payment of taxes do not need to be paid (CBS, 2022a; Government of the Netherlands, 2020). These data are obtained from the tax authorities.

Our indicator of financial support comprises more support measures, but the above are the main ones and the use of the other types of support is relatively small.

Estimation approach

- Probit estimation: Pr(support = 1) = f(TFP1, …, TFP10), where TFPi = 1 if firm is in i-th TFP decile

- (Unconditional) quantile regression:
  - OLS: $\text{RIF}(Y; q_\tau) = X\beta_\tau + W'\gamma_\tau$

    Where $\text{RIF}(Y; q_\tau) = q_\tau + \frac{\tau - I\{Y \leq q_\tau\}}{f_Y(q_\tau)}$, *re-centered influence function*

  - β_τ is the marginal effect of a change in X on the quantile value q_τ of the distribution of Y

- We calculate TFP as a simple Solow residual
  - Using industry level time-varying cost shares (Dutch growth accounts)
  - And we also denominated by industry median by year (controls for industry/time effects)

Probit results: a declining pattern across pre-pandemic TFP distribution
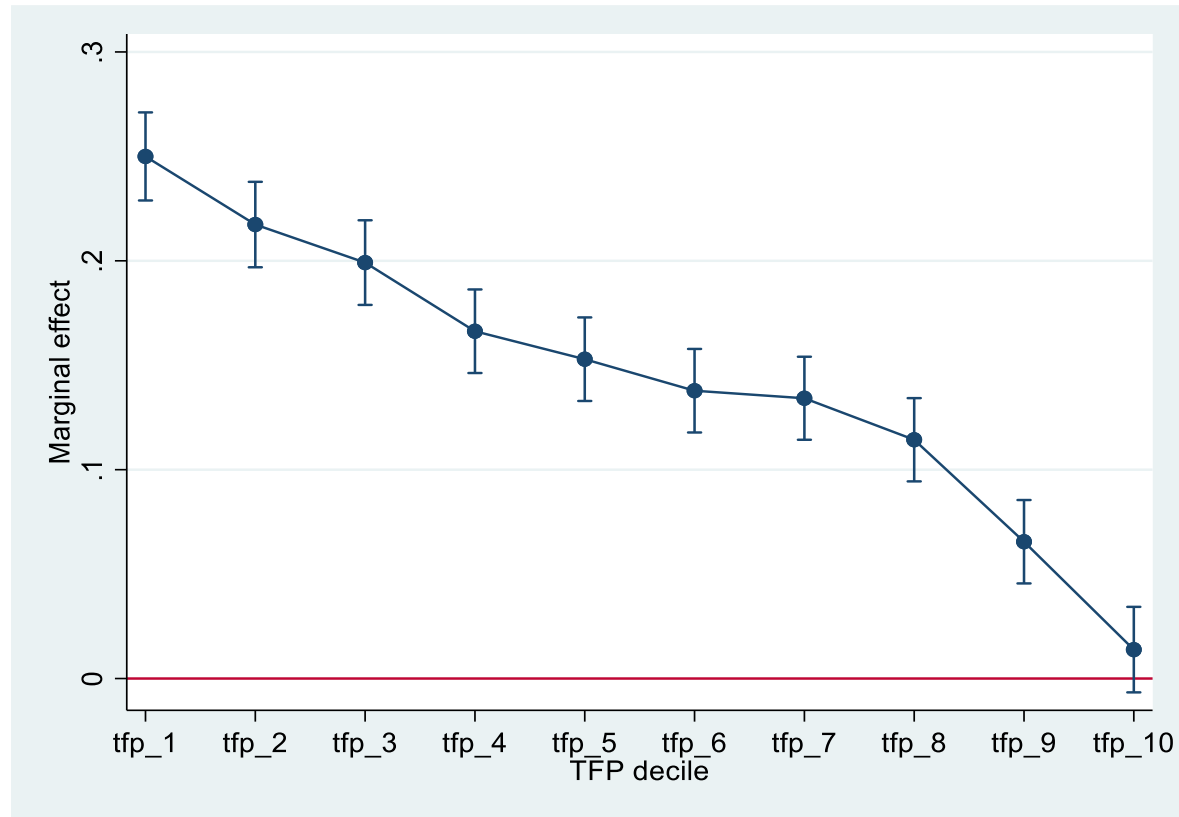
Marginal effects: e.g. moving from TFP_5 to TFP_1 is associated with change in Pr[support] = MFX(TFP_5) − MFX(TFP_1) = ~25 pp - ~15 pp = ~10 pp

Pattern reasonably consistent across sectors Comparable with other studies for NL (Freeman ea 2022; Bighelli ea 2022)

Pre-pandemic High-TFP firms probably did not (have to) file for support…

Low-TFP firms received bulk of support; risk that less-viable firms were supported

Quantile regression: (pre-pandemic) TFP distribution

	OLS	RIF-OLS				
	Mean	q10	q25	q50	q75	q90
	(1)	(2)	(3)	(4)	(5)	(6)
SUPPORT	-0.136***	-0.033***	-0.053***	-0.123***	-0.164***	-0.236***
	(-16.79)	(-3.10)	(-6.43)	(-14.89)	(-16.80)	(-14.14)
INDUSTRY dummies	Yes	Yes	Yes	Yes	Yes	Yes
FIRM SIZE dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	21,009	21,009	21,009	21,009	21,009	21,009
$N_{SUPPORT}$	13,673	13,673	13,673	13,673	13,673	13,673
$N_{NO\ SUPPORT}$	7,336	7,336	7,336	7,336	7,336	7,336
R-square	0.128	0.071	0.129	0.152	0.078	0.031

Overall: negative association between pre-pandemic TFP and probability of support (OLS)
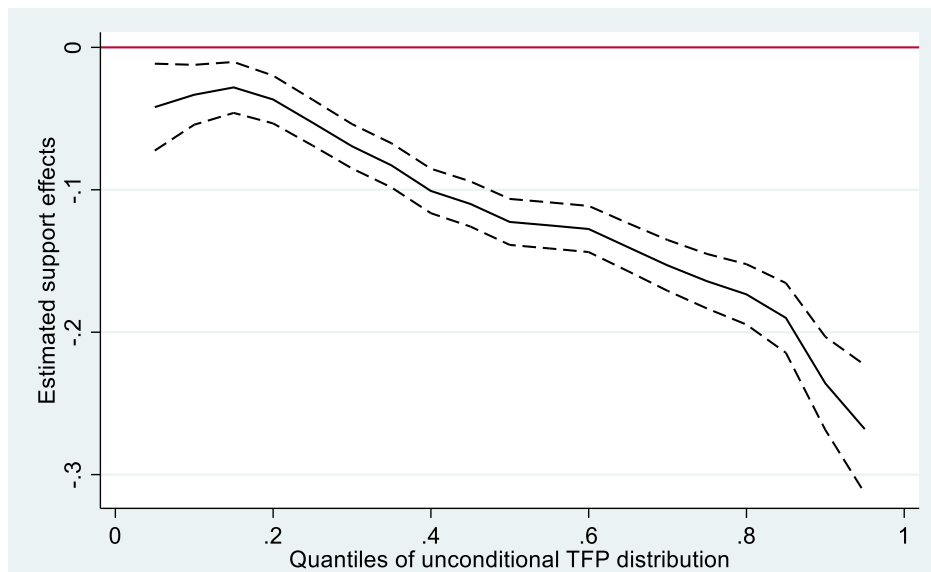
With **quantile regression**:

TFP differential between support and non-supported firms increases with TFP quantile

Non-supported firm TFP distribution is "wider", and has longer right tail

High-productive firms relatively more resilient. No need to apply for support, or do not match criteria.

Low-productive firms less resilient and bigger probability to match criteria. Risk: keeping alive firms that might have left the market under normal circumstances (Freeman ea 2021).

Similar picture for **pre-pandemic investment**: firm receiving support were already investing less, hence probably with lower productivity outlook

Quantile regression: (pre-pandemic) investment distribution

Panel A: logINVESTMENT in 2019 as dependent variable

SUPPORT	-0.142***	0.0007	0.0035	-0.0956***	-0.2374***	-0.2958***
	(-7.39)	(0.02)	(0.17)	(-4.21)	(-6.74)	(-6.63)
INDUSTRY dummies	Yes	Yes	Yes	Yes	Yes	Yes
FIRM SIZE dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	24,788	24,788	24,788	24,788	24,788	24,788
$N_{SUPPORT}$	15,916	15,916	15,916	15,916	15,916	15,916
$N_{NO\ SUPPORT}$	8,872	8,872	8,872	8,872	8,872	8,872
R-square	0.401	0.082	0.179	0.317	0.323	0.256

Similar picture for **pre-pandemic investment**: firm receiving support were already investing less, hence probably with lower productivity outlook

Panel A: Total investment in 2019
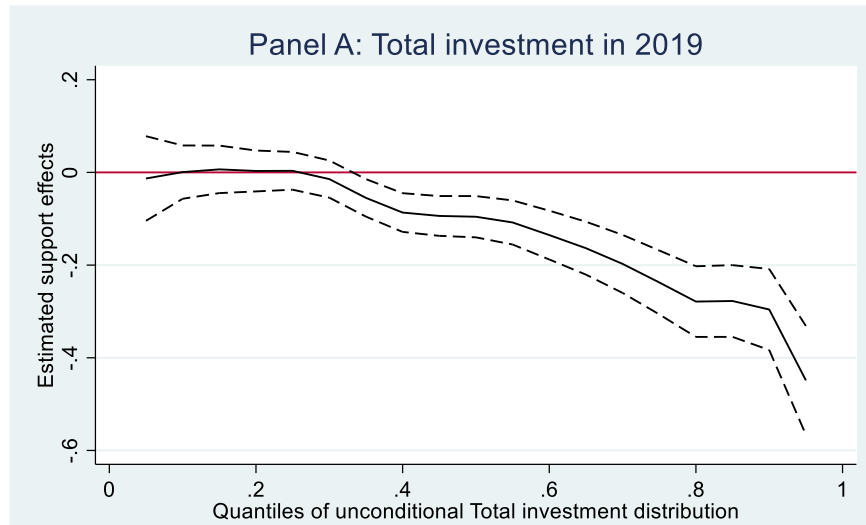
Investment differentials between supported and non-supported firms along the 2020 investment distribution

SUPPORT	-0.304***	-0.2197***	-0.1621***	-0.2335***	-0.3617***	-0.4294***
	(-16.93)	(-7.70)	(-7.33)	(-11.80)	(-12.26)	(-9.19)
INDUSTRY dummies	Yes	Yes	Yes	Yes	Yes	Yes
FIRM SIZE dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	26,050	26,050	26,050	26,050	26,050	26,050
$N_{SUPPORT}$	16,182	16,182	16,182	16,182	16,182	16,182
$N_{NO\ SUPPORT}$	9,182	9,182	9,182	9,182	9,182	9,182
R-square	0.405	0.105	0.213	0.328	0.313	0.261

**Overall**: negative association between pandemic investment and probability of support

With **quantile regression**:

Investment differential between support and non-supported firms increases with quantile

Non-supported firm distribution is "wider", and has longer tails, especially to the right

Firms with support probably less resilient, and support does not result in overcoming this differential that would result in a better investment position comparable to non-supported firms, especially at the higher end of the distribution

Firms without support that are able to invest were already in a better position pre-pandemic.

Panel B: Total investment in 2020
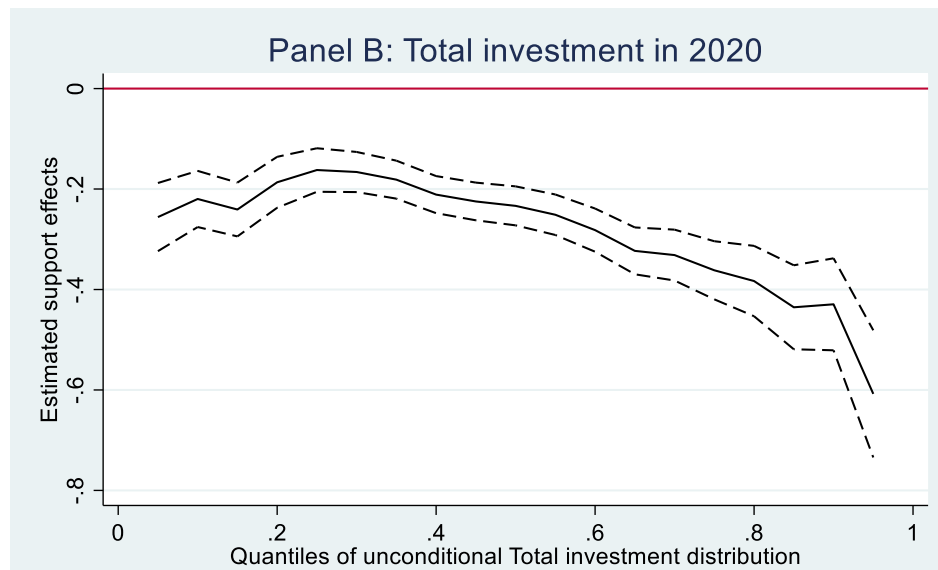
Investment expectations

Table 5.4.1 Average investment expectations for 2021 (N = 1,195).[1]

	No support	Support
High productivity	0	-0.053
Low productivity	-0.015	-0.089

[1] Productivity refers to 2019; support refers to 2020. Expectations are averaged across three possible value (-1 = less investment; 0 = similar investment; 1 = more investment)

Source: Business Cycle Survey (Producer confidence), linked with Production Statistics (SBS) and support measure data

- Also short-term investment expectations are lower for supported firms,
- … especially for low-productive ones

Firm exits

Table 5.4.2. Population shares of exits and continuing firms with and without support.

NACE	Support	2020 No death (%)	Death (%)	2021 No death (%)	Death (%)	2022Q1 No death (%)	Death (%)
Total B-N excl. K & L	**No**	**70.0**	**6.9**	**71.2**	**5.0**	**74.0**	**2.3**
	Yes	**22.7**	**0.3**	**22.9**	**0.9**	**23.3**	**0.5**

- Exit rate 2021 historically low
- 2022Q1 exit relatively high, with high share of supported firms
- Share of supported firms in continuing firms not decreasing

- Firms kept alive that would have exited the market in 2021?
- More supported firms to exit when support was abolished?

- More recent evidence suggests that the impact of support on exits has been small for the Netherlands (Roelandt ea 2022 using StatsNL data)

Synthesis of the two papers

- Statistical analysis in both papers shows that firm heterogeneity matters when analyzing impact of, and adjustment to, the Covid shock

- In particular, firm and trade flow characteristics and variable distributions are important

- Also the pre-pandemic position of a firm matters: firms that were more productive and had invested more were probably more resilient to the shock

- More analysis needed, especially using more recent "post-pandemic" data

Micro-data infrastructure: a Dutch perspective

- Increasing evidence of heterogeneity at the firm-level
- In general, there is a need to explain aggregate statistics from developments at the firm-level and population dynamics
- Evidence on adjustment to Covid-shock underlines this importance
- Yet scarce examples of indicators on heterogeneity in business stats
  - E.g. industry concentration; dispersion; business dynamics aggregate growth
- National evidence gains from international comparisons
  - Need for international microdata infrastructure
  - OECD (DynEmp; MultiProd; ScaleUp), CompNet (remote execution)
  - MicroData Infrastructure (MDI; CompNet together with selected EU productive boards, remote access)
- Potential new role of NSIs/business statisticians? To provide:
  - Structural information on distributional features of macro-statistics
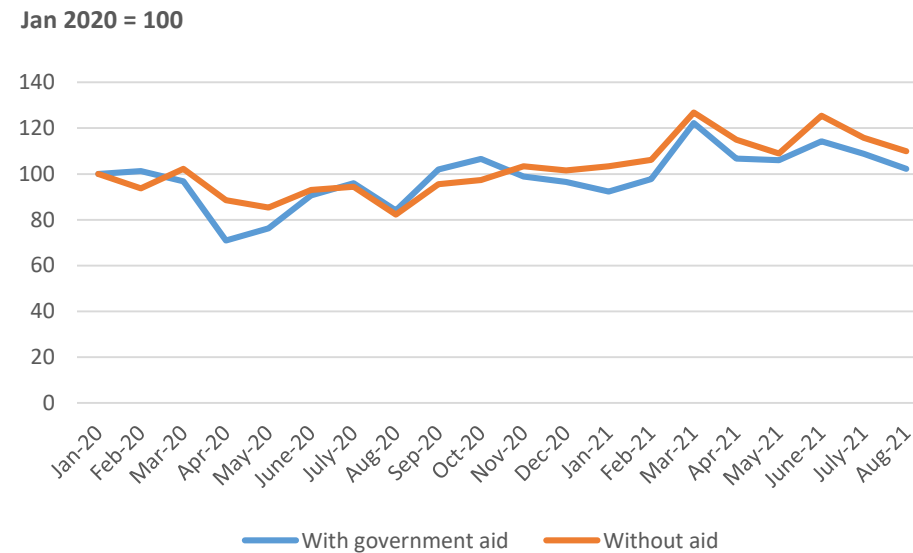 - Facilitate international comparisons of cross-country harmonized microdata

Supplementary slides

Traders more susceptive to apply for financial support
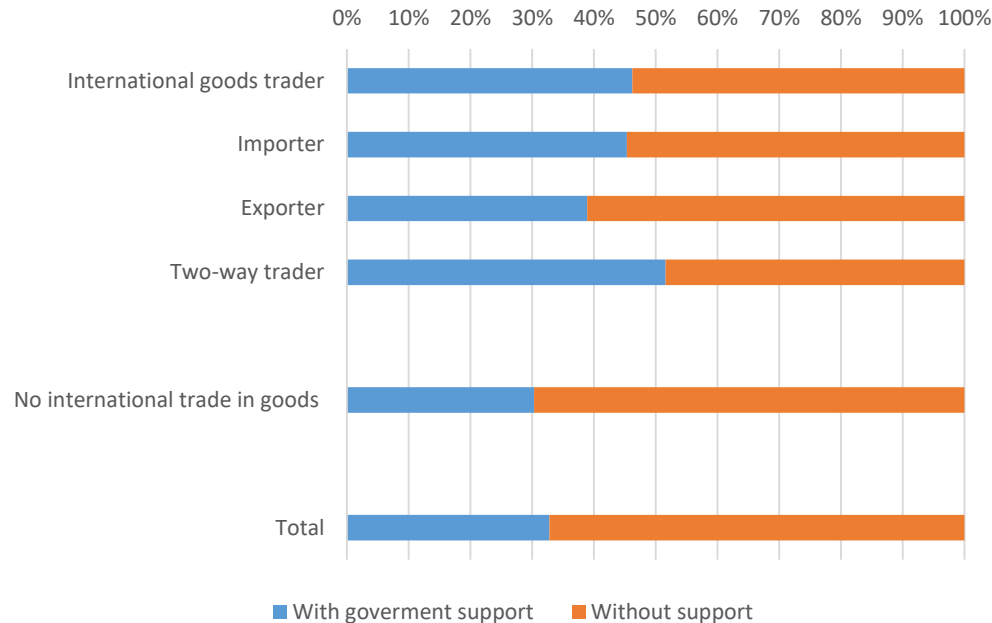
Probability of applying for support [WELKE TYPEN SUPPORT?]
significantly higher for traders,
and highest for two-way traders

Evolution of trade with and without support

Jan 2020 = 100

[export]

- Type of traders
  - Import/export/two-way
  - Perennial/occasional
    - 20% of traders trades continuously; while 80% of trade can be attributed to this group

Box 1. Description of Dutch Covid support measures

(More information: https://www.rijksoverheid.nl/onderwerpen/coronavirus-financiele-regelingen/overzicht-financiele-regelingen.)

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Our indicator of financial support comprises more support measures, but the above are the main ones and the use of the other types of support is relatively small.

8.6 The role of size class in trade performance during the pandemic

	PPML Exporters (All)	Log-linear Exporters (Perennial)	PPML Importers (All)	Log-linear Importers (Perennial)
Corona dummy: pre-crisis as baseline				
Crisis (April 2020 - Sep 2020)	-0.127***	-0.0256*	-0.154***	0.0283**
	(0.0244)	(0.0154)	(0.0234)	(0.0139)
Recovery (Oct 2020 - Mar 2021)	0.0148	0.0649***	-0.0458*	0.0234
	(0.0284)	(0.0183)	(0.0247)	(0.0151)
Growth (April 2021 - June 2021)	0.0423	0.167***	-0.0147	0.153***
	(0.0356)	(0.0219)	(0.0400)	(0.0195)
Independent SME dummy	-1.771***	-0.457***	-2.061***	-0.712***
	(0.0901)	(0.0364)	(0.0850)	(0.0299)
Interaction SME X Corona dummy				
Crisis X SME	0.0962***	-0.0111	0.152***	-0.0399***
	(0.0253)	(0.0168)	(0.0294)	(0.0146)
Recovery X SME	-0.00283	-0.0546***	0.101***	0.000653
	(0.0260)	(0.0188)	(0.0342)	(0.0156)
Growth X SME	0.0237	-0.126***	0.189***	-0.0347*
	(0.0385)	(0.0226)	(0.0566)	(0.0199)

Standard errors in parentheses - * $p<0.10$ ** $p<0.05$ *** $p<0.01$

- Passthrough of costs

-> COEN cijfers

- Business dynamics

-> BATLAB uitkomsten

- Role of digitalization

-> CPB work