The Road to Exporting:

Motivation, Methodology, Data Appendix

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Thank You

We thank the Danish Industrial Fund, The Trade Council, Denmarks' Export Credit Agency, Confederation of Danish Industry, and The Danish Export Association.

Views expressed are those of the authors and potential errors are our own. All information provided are estimates based on Danish firms' past export experiences. As such, they cannot predict with certainty the opportunities and costs of firms' future export decisions.

Motivation

International markets provide opportunities: sales, profits, jobs

Exporting is difficult: information barriers, trade policy, red-tape, institutional differences, risk etc.

Consequence: Many firms don't export and many firms access only few international markets

There is help: Public and private initiatives to mitigate these costs are widespread across developed and developing countries (Jordana et al, 2010)

Challenge: Beyond tariffs and transportation costs, trade costs and benefits of export programs are difficult to measure (Goldberg and Pavcnik, 2016)

Goal: Provide practical and accessible information on export opportunities, costs and benefits of export-support activities to facilitate firms' international activities

Main Parts of the Project

We collect data on Danish firms' export activities and a comprehensive set of public and private export-support activities to provide information that can facilitate firms' export decisions along three dimensions

1. Opportunities: provide statistics on exports and export-supporting activities to provide information on where Danish firms have export demand
2. Costs: Provide information for initial sunk start-up costs to enter (re-enter) a foreign market and fixed costs per period to continue existing export activities
3. Export-support services: Provide information on the extend and effectiveness of various programs to support export activities

Part 1

Part 1: Opportunities

Provide statistics on exports and export-supporting activities to provide information on where Danish firms have export demand and to what extend firms have used export promotion services

Motivation

Often firms don't even know where to first look for export opportunities

Evidence shows that successful exporting depends on knowledge about the foreign market and adoption of business processes

Existing data provides evidence on aggregate trade statistics such as total export flows to destinations, or, industry aggregates, i.e. Comtrade, or The Observatory of Economic Complexity

Goal 1: Provide information on firms' average exports as well as the number of firms that have entered a given export market to provide information on demand for exports and competition

Goal 2: Provide information on export supporting services along with destination level export information

Export Data

We consider exports by all Danish firms between 2007 and 2015

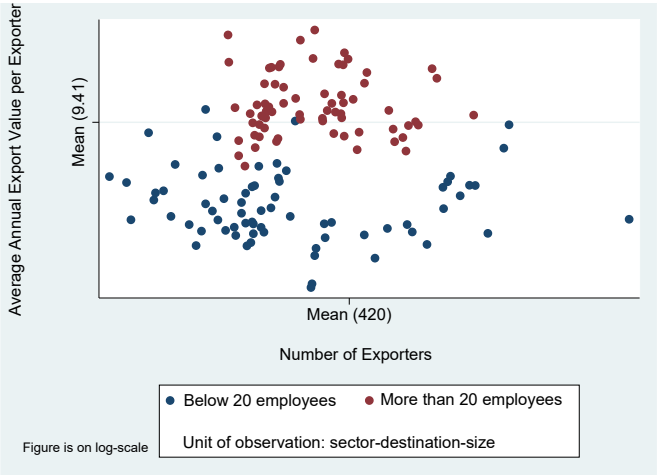
We distinguish firms according to 7 broad sectors: Food and Agriculture, Clothes and Design, Heavy Industry, Machinery, Electronics, Retail and Wholesale, Services

We distinguish firms by size, i.e., less than 20 employees or more than 20 employees

For each sector-firm-size combination we focus on the top 10 export destinations

Across the top 10 export destinations, the figure on the next slide shows the relationship between the number of firms exporting to each destination and average exports per destination

Export Intensity and Competition



By sector, firm-size and destination, each dot shows the number of Danish exporters and the average annual export intensity per firm

Export intensity: Total exports from 2007 to 2015 divided by total number of positive exporter-year combinations

Smaller firms have lower export intensity

High export intensity/high nr of firms $\Rightarrow$ high demand; high nr of firms/ low export intensity $\Rightarrow$ high competition

List of Top Export Destinations

For each sector size combination we consider the top 10 export destinations by export volume

The list of countries among the top destinations with number of times the destination is a top 10 destination is as follows: Belgium (1), Finland (5), France (12), Greenland (1), Hong Kong (1), Ireland (1), Italy (7), Japan (2), China (7), Netherlands (13), Norway (14), Poland (10), Russia (3), Switzerland (1), Singapore (1), Spain (6), Great Britain (14), Sweden (14), Turkey (1), Germany (14), USA (11), Ukraine (1)

Statistics on Website for Export Opportunities

For each sector-firm-size combination we determine Denmark's top 10 export destinations

For each sector and firm-size category we report six statistics associated with export opportunities for each destination

1. Average annual exports from 2007 to 2015 per exporter
2. Total number of unique exporters between 2007 and 2015
3. Total number of unique active firms between 2007 and 2015

4-6. For comparison; same as 1-3, but for all of Denmark, i.e., not sector and size specific

In some cases values are missing due to Statistics Denmark's reporting guidelines

Note that the potential number of exporters do not changes across destinations as it is simply the count of active firms over the time period

Part 2

Part 2: Costs

Provide information on entry (re-entry) costs and fixed per period continuation costs to serve already existing markets

Motivation

Establishing and maintaining export markets is expensive

Some costs associated with exporting such as tariffs and transportation costs are easily obtainable from transportation and logistics companies

Exporting involves many other costs that are not as easily observable and include start-up costs and continuation costs

Start-up costs include hiring of employees to manage export activities, accumulating information about the export market, developing distribution channels, complying with varying legal and institutional standards, adaptation of products, etc.

Costs to continue existing export activities include the retention of management personnel, continued monitoring of the export market, advertising and marketing activities

Information about these costs is not easily observable and we estimate them using existing economics techniques

Methodology

We first set up a theoretical model of optimizing firms

The model is formulated mathematically, but will be outlined here in a more intuitive manner

The formulation and estimation of the model closely follows Das et al. (2007), Aw et al. (2011), and Rodrigue and Soumonni (2014)

Firms differ in size and productivity, even within industries

Firms compete on the domestic (Danish) market and choose among the European, American, and Asian export markets

Different firms may face different levels of demand even in the same export market

Firms will generally face higher demand if they served the same region in the previous year due to a positive "experience effect"

Export Costs

Whereas it is costless to serve the domestic market - besides the actual production costs - serving a foreign market is costly

Each firm pays a cost in order to serve an export market, and the firm reconsiders its presence in all regions each year

If the firm did not export to the region in the previous year, it will have to pay an "entry cost"

If it did export to the region in the previous year, it will have to pay a "continuation cost"

As firms' present export choices affects their future cost structure, firms need to plan ahead when choosing whether or not - and where to - export

in the model, costs can differ across export regions, sectors, and firm size categories

Decision Making Process

Prior to export decisions, firms learn the profitability of each market

Then, they realize the sizes of entry and maintenance costs

Each firm randomly draws a cost from a known distribution

The costs that we estimate and report are in fact the means of these distributions

This has important implications for how to interpret the estimates. In particular, the estimates reflect the average potential cost, not the average realized cost

As firms that draw low costs will tend to export more often than firms that draw high costs, we should expect the average cost actually paid by exporting firms to be somewhat lower than what we have estimated

With this information at hand, firms make entry, continuation and production decisions to maximize profits

Estimation

We match it to Danish register data and estimate the model's parameters

We apply an advanced but widespread statistical procedure

Intuitively, the procedure chooses the parameters such that the observed export behavior by Danish firms are in line with what the model would predict

For example, if an export region is predicted to be very profitable, but, still, is only served by few firms, the model would attribute this to high export costs

As such, estimates are determined by past export behavior of Danish firms and modeling assumptions

Data

For each sector we include all firms that are active between 2012 and 2015

Include firms that report employees

Include all observations as along as the key variables are reported (minor restriction)

Summary Statistics on Exports

		Europe		Americas		Asia	
Sector	Size	Median	OBS	Median	OBS	Median	OBS
Food and agric.	Small	0.09	162	0.03	71	0.03	36
Food and agric.	Large	5.34	1067	0.29	462	0.73	362
Clothes and Design	Small	0.19	403	0.09	193	0.09	132
Clothes and Design	Large	2.56	794	0.25	473	0.41	372
Heavy industry	Small	0.13	362	0.06	112	0.15	88
Heavy industry	Large	3.08	1980	0.39	1025	0.39	905
Electronics ind.	Small	0.24	185	0.15	146	0.23	120
Electronics ind.	Large	10.75	457	1.21	385	2.61	385
Machinery/transp.	Small	0.26	404	0.18	198	0.16	146
Machinery/transp.	Large	12.31	1020	1.42	769	1.60	663
Wholesale*	Small	0.27	4708	0.07	2193	0.11	1379
Wholesale*	Large	1.82	4799	0.17	2757	0.26	1784

Note: Yearly median export values are reported in million dkk. Unit of observation is firm-year. *In the cost calculations only the the sub-industry "Wholesale trade, except of motor vehicles and motorcycles." is included and not the retail sector due to data restrictions.

Estimates: Food and Agriculture Industries

	Europe	Americas	Asia
Fixed Costs, All Firms	1.3	1.3	1.3
Entry Costs, All Firms	30.4	30.4	30.4
Fixed Cost, Small Firms	1.1	0.9	1.1
Entry Cost, Small Firms	23.6	41.1	52.8
Fixed Cost, Large Firms	3.4	3.1	3.1
Entry Cost, Large Firms	40.5	21.2	35.4

All values estimated in millions of Danish Kroner

Small firms: firms with less than 20 employees

Large firms: firms with more than 20 employees

Estimates: Clothes and Design

	Europe	Americas	Asia
Fixed Costs, All Firms	1	1	1
Entry Costs, All Firms	22.9	22.9	22.9
Fixed Cost, Small Firms	0.5	0.3	0.3
Entry Cost, Small Firms	13.7	71.5	24
Fixed Cost, Large Firms	1.5	4.5	0.8
Entry Cost, Large Firms	9.9	54.8	16.7

All values estimated in millions of Danish Kroner

Small firms: firms with less than 20 employees

Large firms: firms with more than 20 employees

Estimates: Heavy Industry

	Europe	Americas	Asia
Fixed Costs, All Firms	2.4	2.4	2.4
Entry Costs, All Firms	41.3	41.3	41.3
Fixed Cost, Small Firms	0.7	0.5	0.5
Entry Cost, Small Firms	12.3	9.9	18.6
Fixed Cost, Large Firms	2	2.6	1.6
Entry Cost, Large Firms	15	58.6	29.4

All values estimated in millions of Danish Kroner

Small firms: firms with less than 20 employees

Large firms: firms with more than 20 employees

Estimates: Machinery and Transport Industry

	Europe	Americas	Asia
Fixed Costs, All Firms	1.4	1.4	1.4
Entry Costs, All Firms	58.7	58.7	58.7
Fixed Cost, Small Firms	1.5	0.2	0.5
Entry Cost, Small Firms	43.4	1.3	18.9
Fixed Cost, Large Firms	1.1	0.5	0.6
Entry Cost, Large Firms	26.9	8.3	15.7

All values estimated in millions of Danish Kroner

Small firms: firms with less than 20 employees

Large firms: firms with more than 20 employees

Estimates: Electronics Industry

	Europe	Americas	Asia
Fixed Costs, All Firms	0.7	0.7	0.7
Entry Costs, All Firms	19	19	19
Fixed Cost, Small Firms	0.4	0.4	0.3
Entry Cost, Small Firms	6	7.2	6.4
Fixed Cost, Large Firms	1.4	0.4	0.4
Entry Cost, Large Firms	14.9	4.8	5.7

All values estimated in millions of Danish Kroner

Small firms: firms with less than 20 employees

Large firms: firms with more than 20 employees

Estimates: Wholesale and Retail

	Europe	Americas	Asia
Fixed Costs, All Firms	0.4	0.4	0.4
Entry Costs, All Firms	6.2	6.2	6.2
Fixed Cost, Small Firms	0.3	0.2	
Entry Cost, Small Firms	3.4	3	
Fixed Cost, Large Firms	1	0.4	
Entry Cost, Large Firms	12.3	3.1	

All values estimated in millions of Danish Kroner

Small firms: firms with less than 20 employees

Large firms: firms with more than 20 employees

For some sector size region combinations we could not estimate entry and maintenance costs due to limited data availability

Reporting of Estimation Results on Website

Direct estimates from the empirical procedure depend on modeling assumptions and are difficult to interpret

On the website, we report entry and maintenance costs in five categories from low (1) to high (5)

When estimates are not available, we report n.a.

The scales are as follows:

Continuation costs: 0-0.05=1, 0.5-1=2, 1.-1.5=3, 1.5-2=4, 2-2.5=5

Entry costs: 0-10=1, 10-20=2, 20-30=3, 30-40=4, 40+ =5

Details are reported in the excel file All_Results_and_Data_Appendix.xls available for download

Part 3

Part 3: Export Support Services

Export promotion services: Provide information on the extend and effectiveness of various programs to support export activities

Motivation

Exporting is challenging

A large number of public and private initiatives exist to help firms successfully enter and maintain export markets

A large literature exists to examine the effectiveness of export-supporting programs

- Existing literature mostly examines individual programs independently
- Institutional differences across countries question external validity (Jordana et al, 2010)

Goal: Provide empirical evidence on how various export-support programs have affected exports by Danish firms

Export-Support Services we Examine

Export Credits: Data on amount of credits, type, time length and few other characteristics that firm received for a given export destination (provided by the EKF)

Export Promotion: Export promotion activities on partner search, market analysis, innovation centers, and all other activities that firms obtained for each destination (provided by Trade Council)

Foreign Visits: Visits by foreign leaders, including country of origin, of Danish firms (provided by Confederation of Danish Industry (DI)).

Public Trade Missions: Data on public trade missions including destination and participating firms (provided by the Trade Council)

Private Trade Missions: Data on purely private trade missions including participating firms and destination (provided by the Export Association)

Literature -Export Credits

Several papers examine industry and country level data and estimate positive effects of public export credits for countries including Austria, Germany, USA, Czech Republic and Turkey (Egger and Url, 2006; Felbermayer and Yalcin, 2013; Auboin and Engemann, 2014; Janda, Michalikova and Skuhrovec; Agarwal and Wang, 2018; Polat Yesilyaprak, 2017)

For Austria and Germany some firm level evidence exists (Ferlbermayer, Heiland and Yalcin, 2012; Heiland and Yalcin 2015Badinger and Url, 2013)

Similar to our data, Agarwal Lodefalk Tang Tano Wang (2018) follow an approach similar to Munch and Schaur (2018) and apply firm-destination level data for Sweden to examine export performance, employment and value added

All of these papers tend to report large and positive effects of public export credits on export performance

Literature - Trade Missions

Results on the effectiveness of trade missions on export performance in the literature are mixed

Head and Ries (2010) apply a gravity estimation approach using Canadian import and export data and find no meaningful effect

Creusen and Lejeur (2013) identify a positive effect of trade missions on exports for small and medium sized export destinations employing destination level information on trade missions and trade promotion

Alvarez (2004) surveys about 190 firms from the UK about their experience on trade missions and their export decisions post mission completion

Palangkaraya and Webster (2019) employ firm level data from Victoria, Australia including firm level participation in trade missions and export performance to identify a positive effect on the intensive and extensive margin

Literature - Diplomacy and Visits

Fuchs and Klann (2013) provide evidence that visits by the Dalai Lama affect countries' export opportunities with China, although this effect may be short lived (Lin, Hu and Fuchs 2019)

Lin, Yan and Wang (2017) examine the effect of visits between Africa and China on international trade using a gravity model

Nitsch (2007) applies a gravity model to examine the relationship between visits by Heads of State and international trade

Several paper examine the relationship between embassies and foreign representation on international trade using aggregate level data (Cassey, 2012; Cassey 2014; Rose, 2007; Visser, 2019)

Ferguson and Forslid (2019) provide firm-level evidence on the impact of embassies on trade

Literature - Export Promotion

A substantial literature examines the effectiveness of export promotion at the aggregate level and the evidence is mixed (e.g. Bernard and Jensen, 2004; Lederman, Olarreaga and Payton, 2010)

For a detailed review see Brooks and van Biesebroeck (2016)

At the firm level, evidence shows positive and significant effects for the destination and product extensive margin, the intensive margin and export survival (Martincus and Carballo, 2008; Volpe Martincus and Carballo, 2010; Martincus and Carballo, 2010, 2012; Van Biesebroeck, Yu, and Chen 2015; Cadot et al. 2015).

Munch and Schaur (2018) provide the first preliminary evidence using firm-destination specific information on export promotion

Data for Danish Export-Support Services

Table: Number of firms that purchased services per year

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Export Promotion	2338	2219	2228	2124	1981	1950	1914	1701	1668
Export Credits	44	47	60	79	107	114	129	141	130
Public Trade Missions	547	862	861	987	1042	995	973	932	942
Foreign Visits	71	97	64	138	152	168	191	143	126
Private Trade Missions		9	45	75	95	151	172	165	196

A firm is counted if it purchased/obtained one or more services from the particular agencies under consideration

Export promotion services by the Trade Council account for the largest number of firms

Within each year there is a relatively low number of treated firms that received credits

Data for Danish Export-Support Services

Table: Number of destinations served per year

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Export Promotion	63	65	68	67	72	68	66	63	61
Export Credits	36	36	49	62	73	76	78	81	68
Public Trade Missions	30	35	37	39	39	36	41	43	45
Visits	7	10	7	11	14	20	22	18	16
Private Trade Missions		4	12	17	19	17	20	24	26

A destination is considered served if any firm we observe in the data purchased an export service for that destination.

Across all agencies major economies are served, ignoring not-served destinations eliminates very little export value

Data for Danish Export Support Services

Table: Number of firm-destination pairs for which services were purchased/obtained

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Export Promotion	4366	4206	4173	3920	3569	3463	3265	2920	2841
Export Credits	68	76	105	121	145	176	213	233	204
Public Missions	752	1386	1413	1676	1873	1704	1617	1637	1642
Visits	89	130	77	177	215	277	325	221	192
Private Missions		10	67	125	144	232	281	229	273

A firm may purchase services for multiple destinations, but no services for other destinations

This table counts the number of firm-destination pairs for which services were purchased

Data: Treated Trade Flows

The data shows what firms purchased export services for what destination with a date

To examine extend and effectiveness of export services we match export services with export flows

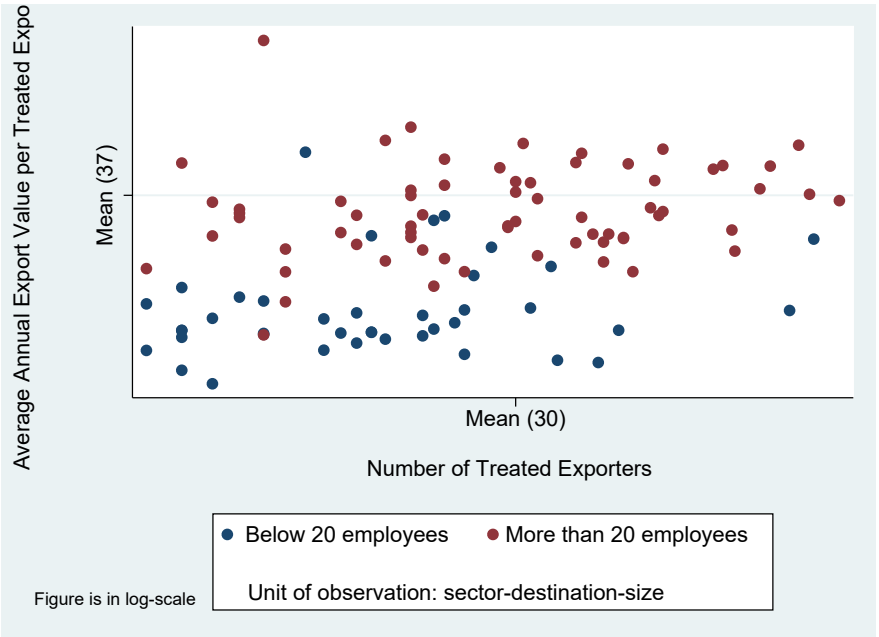
> Definition of an export flow: the total value some firm i exports in year t to destination d
>
> $\Rightarrow$ Each annual export value of any firm to a particular destination is a separate export flow

To match treatment with exports we must determine what trade flows receive the benefit of the services

Brooks and van Biesebroeck (2017): A export flow is treated if the firm purchased export services in the year we observe the export flow, or, the year before we observe the export flow

Note: A treated export flow can be positive, or, zero (if the firm does not export after receiving services)

Data: Treated Trade Flows



Dots show the average export intensity of treated exporters (x-axis) and the number of treated exporters between 2007 and 2015 flows (y-axis) for a given sector

Figure only includes the top ten export destinations within each sector and size category

Reporting of Treatment Information on Website

Combined with results on export opportunities explained on slide 10 we report three statistics associated with export services based on all data from 2007 to 2015

For "Your Results" we compute these statistics for each sector and firm-size combination for each destination we report on the website

In the "All" column, we report comparable statistics for Denmark as a whole, i.e. including all sectors and firms, but still within each destination

The following slides explain how we compute the statistics

Conditional on Treatment with Support Services: Average exports across exporters - Your Results Column

For each given sector-by-firm-size-by-destination combination using data between 2007 and 2015:

- Keep all firm-year observations that show a positive export
- Calculate the total trade value for all treated exporters (A)
- Count the number of firm-destination-year observations for the treated exporters (B)
- Average exports across exporters$= A/B$

Conditional on Treatment with Support Services: Number of Exporters - Your Results Column

For each given sector-by-firm-size-by-destination combination using data between 2007 and 2015:

- Keep all firm-year observations that show a positive export
- Keep all observations that were treated with an export support service
- Drop duplicate firm observations
- Number of Exporters=Count of the firms that received a treatment

Conditional on Treatment with Support Services: Number of Potential Exporters - Your Results Column

For each given sector-by-firm-size-by-destination combination using data between 2007 and 2015:

- Keep all firm-year observations that show a positive or zero export and were treated with a support service
- Drop duplicate firm observations
- Number of potential exporters=Count of the firms that received a treatment independent of whether they exported

Conditional on Treatment with Support Services: Number of Potential Exporters - All Column

For each given destination using data between 2007 and 2015 we repeat the computations from the previous three slides to obtain the comparable statistics

Across all statistics, in some cases the values are missing for a particular sector and firm-size group. The reason is that we censor data according to Statistics Denmark's reporting guidelines to not reveal information related to individual firms or small groups of firms

Effectiveness of Danish Export Support Services

We merge highly detailed export Data with the data on export-support services to estimate the effect of the export services on export performance

We focus on two export performance measures

1. How much firms export (intensive margin)
2. Likelihood of exporting (extensive margin)

We evaluate export services independently and jointly

We consider heterogeneity in effectiveness across regions, sectors and firm size

We examine interaction effects and the effectiveness of special export programs like innovation centers, and individual services like partner match and intelligence and analysis

The following slides will explain the methodology in detail

Intensive Margin: Boost

Let $Treat_{idt} = 1$ if the export flow was treated with export services in the current or previous period and zero otherwise

Let EXV_{idt} be the observed export value

We related firm(i)-destination(d)-year(t) specific log export values to treatment with the empirical model

$$ln(EXV_{idt}) = \beta Treat_{idt} + \eta_{dt} + \lambda_{it} + \gamma_{id} + \epsilon_{idt} \quad (1)$$

The fixed effects λ_{it} accounts for differences in firm characteristics including productivity, size, quality, etc.

The fixed effects γ_{id} accounts for firm-destination specific difference in demand and trade costs

The fixed effects η_{dt} accounts for macro economic changes in the destination economy

Goal: Estimate β, for small values $\beta \times 100$ approximately equals the percentage boost of treatement on export values

Extensive Margin: Entry

Let $Treat_{idt} = 1$ if the export flow was treated with export services in the current or previous period and zero otherwise

Let $Entry_{idt}$ equal 1 if firm(i) exported to destination d in year t an zero otherwise, our model of interest is:

$$Entry_{idt} = \delta Treat_{idt} + \eta_{dt} + \lambda_{it} + \gamma_{id} + \epsilon_{idt} \tag{2}$$

The fixed effects λ_{it} accounts for differences in firm characteristics including productivity, size, quality, etc.

The fixed effects γ_{id} accounts for firm-destination specific difference in demand and trade costs

The fixed effects η_{dt} accounts for macro economic changes in the destination economy

Goal: Estimate δ, change in likelihood of exporting in percentage points due to treatment

Estimation: Boost

We merge the population of Danish export flows at the firm-year-destination level with the treatment indicator

We include all information form 2007 to 2015

We include all firms that report positive employees

We include all destiantions for which at some point export services were purchased

We apply Ordinary-Least-Squares estimation with indicator variable to estimate the model

All reported standard errors are robust with respect to heteroskedasticity

For more details on the data, estimation procedures and alternative empirical models see (Munch and Schaur, 2018; Buus, Munch, Rodrigue and Schaur, 2019a)

Estimation: Entry

We start with the population of export flows as explained in the previous slide

Next we fill in a zero export value for all destinations to which a given firm could have exported but did not

Then, we generate the indicator $Entry_{idt} = 0$ is export values are zero and $Entry_{idt} = 1$ if export values are positive

We apply Ordinary-Least-Squares estimation with indicator variable to estimate the model

All reported standard errors are robust with respect to heteroskedasticity

For more details on the data, estimation procedures and alternative empirical models see (Munch and Schaur, 2018; Buus, Munch, Rodrigue and Schaur, 2019a)

Results: Effect on Export Values (boost)

Table: Intensive Margin (boost): Broad results by support service

	Promotion	Credits	Missions	Priv. missions	Visits	ALL
lpromotion	0.057^{a}					0.045^{b}
lcredit		0.749^{a}				0.742^{a}
lmissions			0.043^{b}			0.0446^{b}
lpriv_missions				0.114^{b}		0.117^{b}
lvisit					0.027	0.026
DoF	651542	651542	480856	480856	480856	480852

Firm-dest, firm-year and region-year FE are included in all regressions.
^{c} $p < .10$, ^{b} $p < .05$, ^{a} $p < 0.01$

As an example, promotion services by the Trade Council raise exports by approximately 5.7 percent

Estimating for each support service separately or combined in one regression does not make a practical difference to the results

These estimates provide information for the benchmark results on the website

Results: Effect on Entry

Table: Extensive Margin (entry): Broad results by support service

	Promotion	Credits	Missions	Priv. missions	Visits	ALL
Ipromotion	0.024^a					0.023^a
Icredit		0.146^a				0.137^a
Imissions			0.030^a			0.028^a
Ipriv_missions				0.012		0.015^c
Ivisit					0.014^c	0.013^c
Nr. obs.	28311481	28311481	20726253	20726253	20726253	20726249

Firm-dest, firm-year and region-year FE are included in all regressions.
^{c} $p < .10$, ^{b} $p < .05$, ^{a} $p < 0.01$

In either the individual or combined regression all support services show a positive effect on the extensive margin

Again, credits have the larges impact

Results in the individual versus combined regression are similar

These estimates provide information for the benchmark results on the website

Firm and Sector Specific Results

To provide information on the effectiveness of support services that is tailored to specific sectors and firms we next estimate treatment effects for various subgroups for each service

Sector and size specific effects:

- For each of 7 sectors, we estimate intensive margin and extensive margin effects for small and large firms
- These are the results reported for "See your results" for each individual support service

Region specific results:

- For each of 7 sectors, we estimate intensive margin and extensive margin effects for the regions of Americas, Europe and Asia
- These are the results reported for Export Promotion by Region

Methodology for Subgroup Estimation: Sector and Size

For a given sector, let $0Treat_{idt} = 1$ if the firms has less than 20 employees and received export services in the current or previous period, zero otherwise

For a given sector, let $1Treat_{idt} = 1$ if the firms has more than 20 employees and received export services in the current or previous period, zero otherwise

We then estimate sector specific parameters from the models

$$\begin{aligned} ln(EXV_{idt}) = &\quad \beta_s 0Treat_{idt} + \delta_s 1Treat_{idt} + \eta_{sdt} + \lambda_{it} + \gamma_{id} + \epsilon_{idt} \\ ln(Entry_{idt}) = &\quad \beta_s 0Treat_{idt} + \delta_s 1Treat_{idt} + \eta_{sdt} + \lambda_{it} + \gamma_{id} + \epsilon_{idt} \end{aligned}$$

The estimation routine is the same as above

The sector and size specific coefficients privde the information for the result we report by sector and size as comparison to the benchmark results

Methodology for Subgroup Estimation: Regions

For a given sector, let $E_{idt} = 1$ if the destination d is a destination in Europe and the firm received export services for that destination in current or previous year; zero otherwise

For a given sector, let $A_{idt} = 1$ if the destination d is a destination in Asia and the firm received export services for that destination in current or previous year; zero otherwise

For a given sector, let $AM_{idt} = 1$ if the destination d is a destination in the Americas and the firm received export services for that destination in current or previous year; zero otherwise

Methodology for Subgroup Estimation: Regions

We then estimate sector and region specific parameters from the models

$$
\begin{aligned}
ln(EXV_{idt}) = &\quad \beta_s 0 E_{idt} + \delta_s 1 A_{idt} + \chi_s AM_{idt} + \eta_{sdt} + \lambda_{it} + \gamma_{id} + \epsilon_{idt} \\
ln(Entry_{idt}) = &\quad \beta_s 0 E_{idt} + \delta_s 1 A_{idt} + \chi_s AM_{idt} + \eta_{sdt} + \lambda_{it} + \gamma_{id} + \epsilon_{idt}
\end{aligned}
$$

Estimate for the coefficients β_s, δ_s, χ_s provide the information we use to report region specific results for each sector on the website

Note, due to data limitations, the regional results are not size specific

All region, sector and firm-size specific results are available for download in the excel document All_Results_and_Data_Appendix.xls

Reporting Results on Website: Boost

We report the estimation results in six categories

Let Δ be the expected percentage change in export values due to a specific treatment according to our results

For the intensive margin the scale is as follows

$$\Delta \leq 0 \Rightarrow \text{n.a.},\ 0 < \Delta < 0.05 \Rightarrow 1,\ 0.05 \leq \Delta \leq 0.1 \Rightarrow 2,$$
$$0.1 \leq \Delta \leq 0.15 \Rightarrow 3,\ 0.15 \leq \Delta \leq 0.2 \Rightarrow 4,\ 0.2 \leq \Delta \Rightarrow 5$$

All estimates with a p-value greater than 0.15 are treated as 0

In some cases where subgroup estimates are not available due to data limitation or limited power, we report pooled results as best estimate if the estimates are comparable

For details on how regression results were translated see the excel document All_Results_and_Data_Appendix.xls

Reporting Results on Website: Entry

We report the estimation results in six categories

For the intensive margin the scale is as follows

Estimate$\leq$ 0 $\Rightarrow$ n.a.
0$<$Estimate$<$0.025 $\Rightarrow$ 1
0.025$\leq$Estimate$\leq$0.05 $\Rightarrow$ 2
0.05$\leq$Estimate$\leq$0.075$\Rightarrow$ 3
0.0.75$\leq$Estimate$\leq$0.1$\Rightarrow$ 4
0.1$\leq$Estimate$\Rightarrow$ 5

All estimates with a p-value greater than 0.15 are treated as 0

In some cases where subgroup estimates are not available due to data limitation or limited power, we report pooled results as best estimate if the estimates are comparable

For details on how regression results were translated see the excel document All_Results_and_Data_Appendix.xls

Market Analysis and Partner Match

Among it's services the Trade Council helps Danish firms find foreign partners and provides market analysis for destinations of interest

Market analysis and partner match are the most popular Trade Council promotion products that firms purchase

We want to report if that is the case because these product are particularly effective to improve export performance

We estimate interaction effects to examine this source of heterogeneity

We estimate only over the pooled sample and not by sector, firm-size, or destination due to data limitations when we split out the Trade Council indicator

The next slide explains the methodology

Market Analysis and Partner Match: Methodology

Let $TC_{idt} = 1$ if firm i received services from the Trade Council in year t or $t-1$ for destination d; zero otherwise

Let $PM_{idt} = 1$ if firm i received partner match services from the Trade Council in year t or $t-1$ for destination d; zero otherwise

Let $IA_{idt} = 1$ if firm i received market intelligence and analysis services from the Trade Council in year t or $t-1$ for destination d; zero otherwise

Similar to our baseline models, we then estimate

$$ln(EXV_{idt}) = \beta TC_{idt} + \delta PM_{idt} + \chi IA_{idt} + \eta_{dt} + \lambda_{it} + \gamma_{id} + \epsilon_{idt}$$
$$ln(Entry_{idt}) = \beta TC_{idt} + \delta PM_{idt} + \chi IA_{idt} + \eta_{dt} + \lambda_{it} + \gamma_{id} + \epsilon_{idt}$$

β measures the effectiveness of TC service other than partner match and market analysis including, for example, trade fairs

If $\delta > 0$ or $\chi > 0$ then either market analysis or partner match or both are more effective relative to other services

Market Analysis and Partner Match: Results

Table: Results for Different TC Services

	Intensive Margin	Extensive Margin
Estimate for β	0.062^a	0.031^a
Estimate for δ	0.007	0.025^a
Estimate for χ	0.072^a	0.016^a
DoF	708985	30781085

Firm-dest, firm-year and region-year FE are included in all regressions.
^{c} $p < .10$, ^{b} $p < .05$, ^{a} $p < 0.01$

At the intensive margin, intelligence and analysis and residual TC services have a similar effect, but partner match does not affect the intensive margin

At the extensive margin, partner match and residual services are similarly successful, but intelligence and analysis is slightly less successful

For sector specific results see All_Results_and_Data_Appendix.xls

Reporting of Market Analysis and Partner Match on Website

In part three of the website we report results for export-support services

Under trade council services two pop-up windows report results for partner match and intelligence and analysis combined with baseline estimates

The report scale is the same as for all other export-support effects reported on slides 50 and 51

Innovation Centers

The Ministry of Higher Education and Science aims to increase internationalization of Danish science and innovations

Danish Innovation Centers operate in Shanghai, Silicon Valley, Boston Munich, New Delhi, Sao Paolo, Seoul and Tel Aviv, to facilitate Danish firms' access to knowledge, networks, technology, capital and markets

We estimate the effectiveness of the innovation centers combined with trade council services

Innovation Centers: Methodolody

Let $TC_{idt} = 1$ if firm i received services from the Trade Council in year t or $t-1$ for destination d and no innovation center was associated with the services; zero otherwise

Let $IC_{idt} = 1$ if firm i received services from the Trade Council in year t or $t-1$ for destination d and a innovation center was associated with the services; zero otherwise

Similar to our baseline models, we then estimate

$$ln(EXV_{idt}) = \beta TC_{idt} + \delta IC_{idt} + \eta_{dt} + \lambda_{it} + \gamma_{id} + \epsilon_{idt}$$
$$ln(Entry_{idt}) = \beta TC_{idt} + \delta IC_{idt} + \eta_{dt} + \lambda_{it} + \gamma_{id} + \epsilon_{idt}$$

In both regressions, comparison between δ and β provides evidence if trade council services are particularly effective in locations with innovation centers

Results are on the next slide

Innovation Centers: Results

Table: Results for Innovation Centers

	Intensive Margin	Extensive Margin
Estimate for β	0.054^{a}	$0.024^{a\ a}$
Estimate for δ	0.189^{b}	0.026^{a}
DoF	651541	28311480

Firm-dest, firm-year and region-year FE are included in all regressions.
^{c} $p < .10$, ^{b} $p < .05$, ^{a} $p < 0.01$

At the intensive margin trade council services are particularly effective in association with innovation centers

At the extensive margin innovation centers do not make a difference to the effectiveness of trade council services

For sector specific results see the excel document: All_Results_and_Data_Appendix.xls

Complementary Effects Across Programs

Volpe Martincus and Carballo (2010) focus on export promotion services delivered by the Colombian export promotion agency, PROEXPORT

Services are similar to what the TC provides in Denmark including trade missions, but do not include partner match

Volpe Martincus and Carballo examine if the various services are complement or substitutes

We examine a similar question, but across broader categories such as trade credits, TC services, Private Missions and Visits

The question is whether various export programs are complements or substitutes

As an example, firms that obtain a trade credit, may benefit more from that credit if they have done their homework on market analysis with the Trade Council

Complementary Effects: Methodology

We explain the methodology in terms of Trade Council services, but follow the same methodology for the other programs

Let $TC_{idt} = 1$ if firm i obtained TC services in year t or $t-1$ for destination d; zero otherwise

Let $CR_{idt} = 1$ if firm i obtained a credit in year t or any year before t for destination d; zero otherwise

Define similar indicators as for credits for the other programs, public missions (PuM_{idt}), private missions (PrM_{idt}), and visits (V_{idt})

We then estimtate a model to with the direct Trade Council indicator and the Trade Council indicator interacted with the other indicators

Complementary Effects: Methodology

For the intensive margin we estimate the model:

$$ln(EXV_{idt}) = \beta_1 TC_{idt} + \beta_2 TC_{idt} \times CR_{idt} + \beta_3 TC_{idt} \times PuM_{idt} + \\ + \beta_4 TC_{idt} \times PrM_{idt} + \beta_5 TC_{idt} \times V_{idt} + FixedEffects + \epsilon_{idt}$$

We estimate the same model for the extensive margin

In this case, the coefficients β_2, β_3, β_4 tell if Trade Council services are particularly effective in combination with have previusly received a credit, having participated on a mission, or, having been part of an official visit

We next report results for regressions pooled over all observations

Complementary Effects: Results Intensive Margin

Table: Results for Different TC Services

Service of Interest	TC Services	Credits	Public Mission	Private Mission	Visit
Main Effect	0.04^b	0.978^a	0.027	0.237	-0.001
Interaction of service of interest with:					
Previous TC Services		-0.255	0.021	-0.036	-0.188
Previous Credits	0.26		0.088	0.032	-0.367
Previous Public Missions	0.034	-0.098		-0.202	0.417
Previous Private Missions	0.082	0.105	-0.062		0.053
Previous Visit	-0.107	-0.366	0.216	-0.012	
DoF					

Firm-dest, firm-year and region-year FE are included in all regressions.
^{c} $p < .10$, ^{b} $p < .05$, ^{a} $p < 0.01$

Pooling over all observations it is difficult to discern a clear pattern

Applying a p-value of 0.15, Public Missions and visits do have a positive interaction.

Complementary Effects: Results Extensive Margin

Table: Results for Different TC Services

Service of Interest	TC Services	Credits	Public Mission	Private Mission	Visit
Main Effect	0.022^{a}	0.160^{a}	0.026^{a}	0.014	0.013
Interaction of service of interest with:					
Previous TC Services		-0.040	0.013^{b}	0.018	-0.011
Previous Credits	0.086^{b}		0.033	-0.094^{b}	-0.001
Previous Public Missions	0.020^{a}	-0.062^{c}		-0.010	0.015
Previous Private Missions	-0.030	-0.070^{c}	-0.011		0.015
Previous Visit	-0.004	0.057	-0.023	-0.006	

Firm-dest, firm-year and region-year FE are included in all regressions.
^{c} $p < .10$, ^{b} $p < .05$, ^{a} $p < 0.01$

We find some significant and positive interactions

Trade Council Services combined with Credits and Public Missions are especially successful

Public Missions with previous Trade Council Services are particularly succesfull

Complementary Effects: Reporting on Website

In addition to the pooled estimates reported on the previous slides we also estimated these interaction effects across the various sectors

Detailed estimates are available in the excel document "All_Results_and_Data_Appendix.xls"

Data limitations prohibit narrower definitions of the sample

On the website we highlight only the interactions which are particularly beneficial

References

Agarwal N., Lodefalk M., Tang A., Sofia T. and Wang Z., 2018,Guaranteed Success? The Effects of Export Credit Guarantees on Firm Performance, Working Paper

Alvarez R., 2004, Sources of Export Success in Small-and Medium-sized Enterprises: The Impact of Public Programs, International Business Review, 383-400

Auboin M. and Engemann M., 2014, Testing the trade credit and trade link: evidence from data on export credit insurance, Rev World Econ, 150:715–743

Aw, Bee Yan, Mark J. Roberts, and Daniel Yi Xu, 2011, R&D Investment, Exporting, and Productivity Dynamics, American Economic Review, 101(4), 1312-44

Bernard A. and J. Bradford Jensen, 2004. Why Some Firms Export, The Review of Economics and Statistics, vol. 86(2), pages 561-569

References

Broocks A., and Van Biesebroeck J., 2017, The impact of export promotion on export market entry, Journal of International Economics, 107, 19–33.

Cassey A., 2012, California's Export and the 2004 Overseas Office Closures, Economic Inquiry, 50(3)

Cassey A., 2014, The Location of US State's Overseas Offices, Review of International Economics, 22(2)

Creusen H. and Lejour A., 2013, Market entry and economic diplomacy, Applied Economics Letters, 20:5, 504-507

Das S., Roberts M. and Tybout J., 2007, Market Entry Costs, Producer Heterogeneity, and Export Dynamics, Econometrica, 75(3)

References

Felbermayr G., Heiland I. and Yalcin E., 2012, Mitigating Liquidity Constraints: Public Export Credit Guarantees in Germany, CESIFO WORKING PAPER NO. 3908

Felbermayr G. and Yalcin E., 2013, Export Credit Guarantees and Export Performance: An Empirical Analysis for Germany, The World Economy

Ferguson S. and Forslid R., 2019, Sizing Up the Impact of Embassis on Exports, The Scandinavian Journal of Economics, 121(1)

Fuchs A. and Klann N.-H., 2013, Paying a Visit: The Dalai Lama Effect on International Trade, Journal of International Economics, 91, 164-177

Goldberg P. and Pavcnik N., 2016, The Effects of Trade Policy, NBER 21957

References

Heiland I. and Yalcin E., 2015, Export Market Risk and the Role of State Credit Guarantees, CESIFO WORKING PAPER NO. 5176

Janda K., Michalikova E. and Skuhrovec J., 2013, Credit Support for Export: Robust Evidence from the Czech Republic, The World Economy

Jordana J. , Volpe Martincus C. and Gallo A., 2010, Export Promotion in Latin America and the Caribbean: An Institutional Portrait, IDB-WP-198

Lederman D., Olarreaga M. and Payton L., 2010, Export promotion agencies: Do they work? Journal of Development Economics, 91(2), 257-265

Lin F., Hu C. and Fuchs A., 2019, How do Firms Respond to Political Tension? The Heterogeneity of the Dalai Lama Effect on Trade, China Economic Review, 54, 73-79

Lin F, Yan W. and Wang X., 2017, The Impact of Africa-China's Diplomatic Visits on Bilateral Trade, Scottish Journal of Political Economy, 64(3)

References

Martincus, Christian Volpe, and Jerónimo Carballo. 2010. Beyond the average effects: The distributional impacts of export promotion programs in developing countries, Journal of Development Economics, 92 (2), 201–214

Martincus, Christian Volpe, and Jerónimo Carballo. 2010, Export Promotion: Bundled Services Work Better, The World Economy,

Martincus, Christian Volpe, and Jerónimo Carballo, 2012, Export promotion activities in developing countries: What kind of trade do they promote?, The Journal of International Trade & Economic Development 21(4), 539–578

Martincus, Christian Volpe, and Jerónimo Carballo, 2008. Is export promotion effective in developing countries? Firm-level evidence on the intensive and the extensive margins of exports, Journal of Inter-national Economics 76(1), 89–106

References

Munch J. and Schaur G., 2018, The Effect of Export Promotion on Firm-Level Performance, American Economic Journal, 10(1), 357-87

Nitsch V., 2007, State Visits and International Trade, The World Economy

Palangkaraya A. and Webster E., 2019, Entering the Export Market: Do Trade Missions Help?, ERIA Discussion Paper Series

Polat A. and Yeşilyaprak M., 2017, Export Credit Insurance and Export Performance: An Empirical Gravity Analysis for Turkey, International Journal of Economics and Finance, 9(8)

Rodrigue J. and Omolola Soumonni, 2014, Journal of International Economics, 93(2), 316-338

References

Rose A., 2007, the Foreign Service and Foreign Trade: Embassies as Export Promotion, The World Economy

Spence M., 2003, Evaluating Export Promotion Programmes: U.K. Overseas Trade Missions and Export Performance, Small Business Economics, 20, 83-103

Visser R., 2019, The effect of diplomatic representation on trade: A panel data analysis, The World Economy, 42