



The Dutch business production network dataset

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A firm level production network dataset

Statistics Netherlands has developed a basic dataset on “intermediate transactions” at the individual business level:

- Top down method based on disaggregating Input/output table data from National Accounts, using
 - Supply and use tables
 - Microdata (SBR, SBS/prodcom, VAT-turnover)
 - Observed relations for 350 large companies
 - A link prediction method based on assortativity, industry, geographical distance and commodity group

https://www.researchgate.net/publication/365702702_Reconstruction_method_for_the_Dutch_interfirm_network_including_a_breakdown_by_commodity_for_2018_and_2019_v10?channel=doi&linkId=637f176737878b3e87d8ab9b&showFulltext=true



Overview of the method (1)

Basic idea:

- 1) link potential suppliers and users at the level of 650 individual commodities using all the information we have and
- 2) make the results consistent with the Input/output tables from National Accounts (level of 250 commodities).

For each industry and commodity:

- Start: the firms with annual turnover >10.000 euro
- Estimate supply and use per firm in the SBS sample
- Estimate supply and use for the other firms



Overview of the method (2)

For each commodity:

- Estimate the number of users and suppliers per firm
- Start with observed supplier-user-links (D&B dataset)
- Predict missing supplier-user-links using location, size and NACE-code (matching procedure)
- Estimate the weight of each transaction
- Calibrate the weights with the Input/output tables (marginals and interior structure)

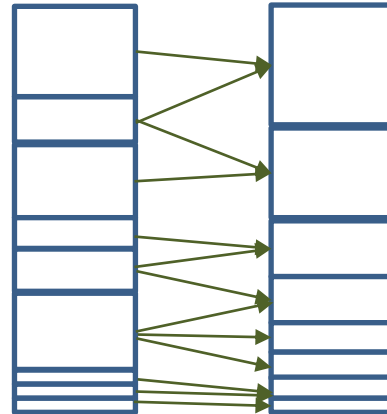


Matching process for 'missing links'

Supply per firm

Use per firm

Ranked by
score (per
using firm)



Ranked
by size

Continu estimating connections until the market for this commodity is cleared



Current status of the dataset

- Currently a version for 2018
- 1.1 million firms (annual turnover >10.000 euro)
- 14.8 million links (firm x firm x commodity group)
- 250 commodity groups
- Fully consistent with IO-tables per commodity group
- Available in microdata RA research environment
- Currently already being used for PhD-research

2019, 2020 and 2021 available in CBS, soon also on RA



Experimental dataset (1)

- It's a 'beta product' that still needs to be improved
- Some known problems:
 - Contains 'self 'loops' that shouldn't be there
 - For the smallest firms links may not be accurate (e.g. because of thresholds used)
- Data for larger firms are better than for smaller ones
- In general: the 'binary structure' seems more plausible than the weights



Experimental dataset (2)

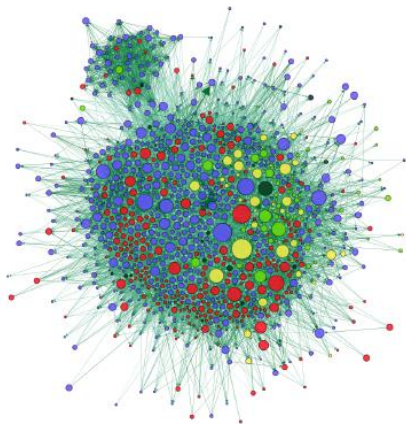
- What you can do: study e.g.
 - Shock propagation
 - Supply chains
 - Communities, functional modules
- What you cannot do with it: study e.g.
 - Network formation
 - Degree distributions



Ongoing R&D at CBS

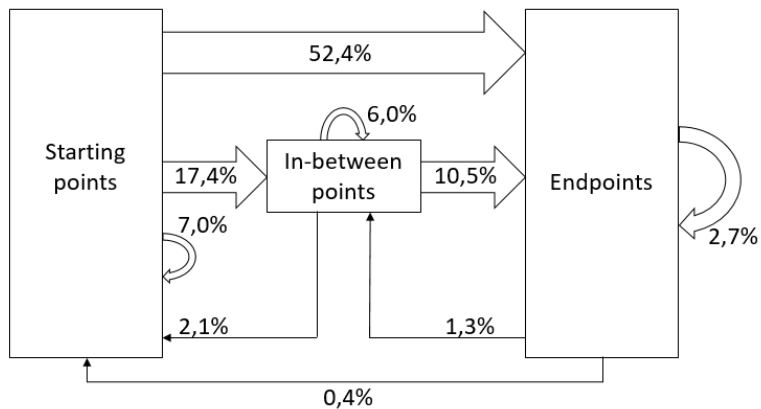
- Develop relevant quality measures
- Improve the method and resulting quality
- Develop publications and analysis tools
- Enhance domestic supplier and user dataset with links with foreign firms (imports and exports) and with employees
- Add further metadata and develop relevant classifications (e.g. 'type of value added to supply chains' by firms)

The Belgian production network



Notes: Network giant connected component (2014). Firms with turnover ≥ 100 mln euro.
Node size proportional to sales value. Manufacturing, Services, Utilities, Construction, Other.

Flows within the Dutch production network; 2018
in % of value of total intermediate transactions



Add structure with
metadata models

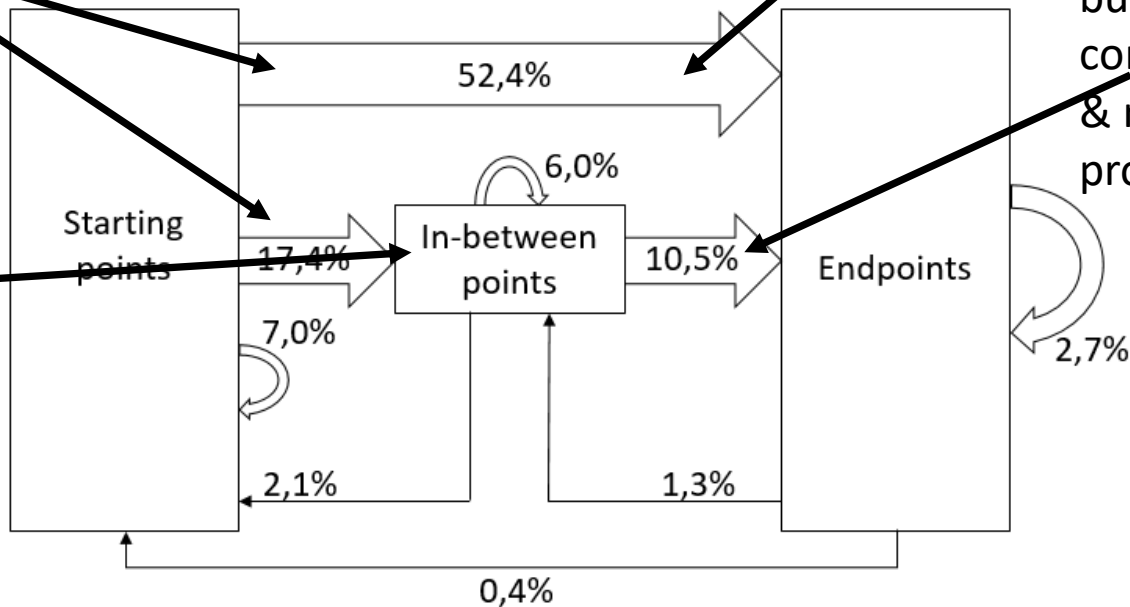
Flows within the Dutch production network; 2018
in % of value of total intermediate transactions

Similar commodity composition

Manufacturing, Construction, Specialized business services most important NACE groups

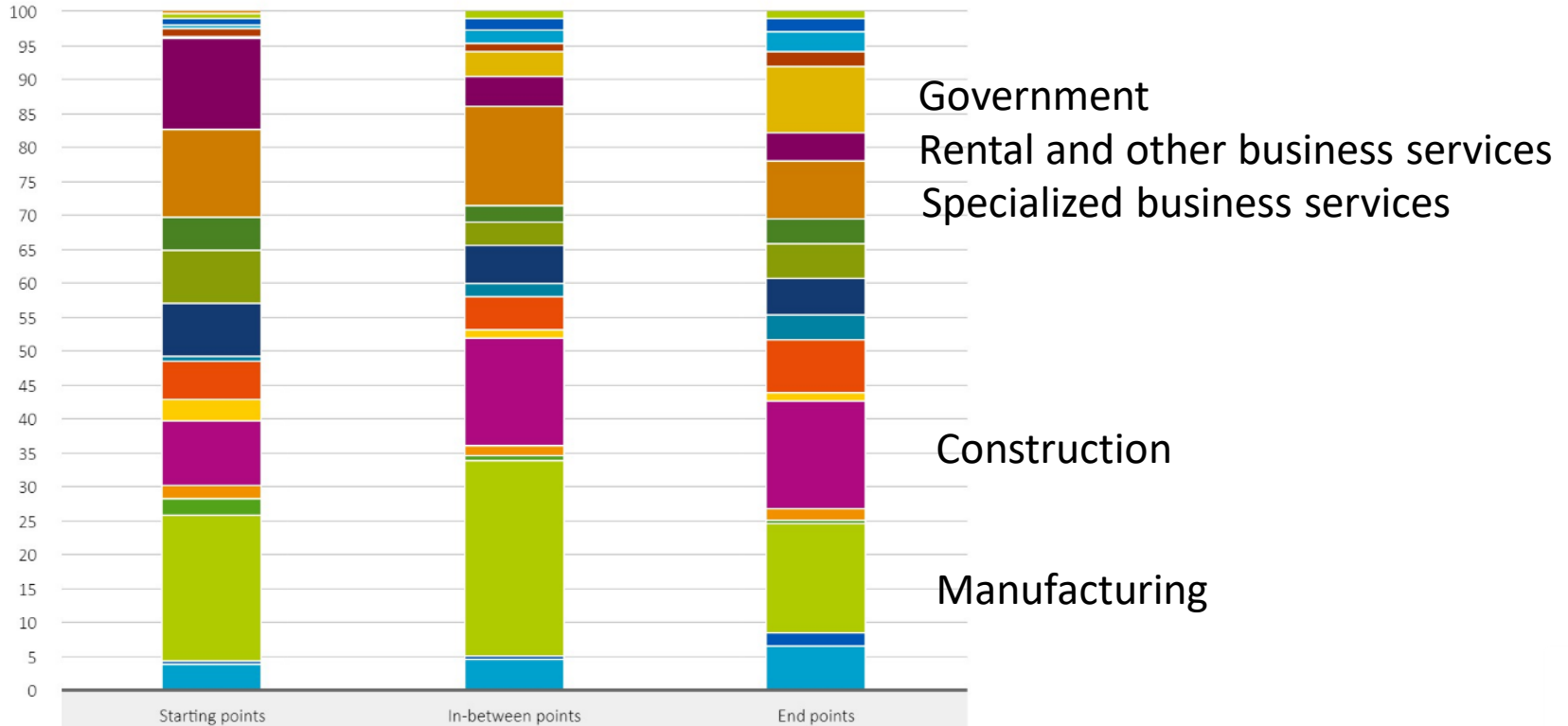
E.g. financial and 'unspecialized' business services

E.g. 'specialized' business services, construction, hotels & restaurant services, processed meat



Share of industries in intermediate transactions starting, in-between and endpoints; 2018

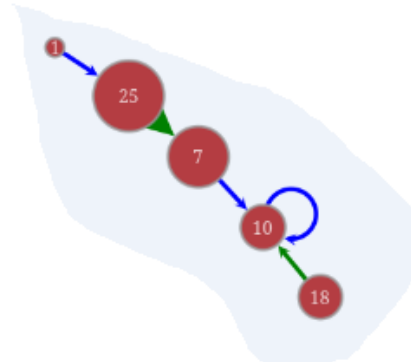
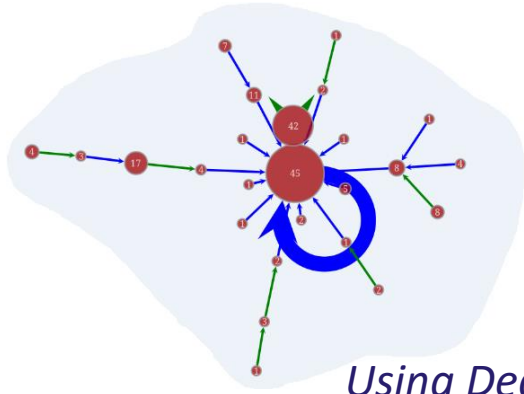
in % intermediate transactions per points type



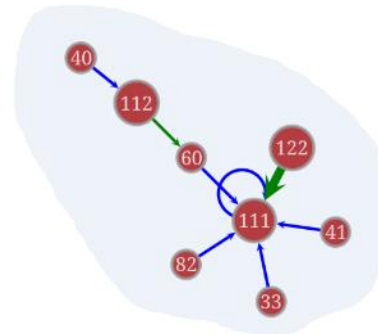
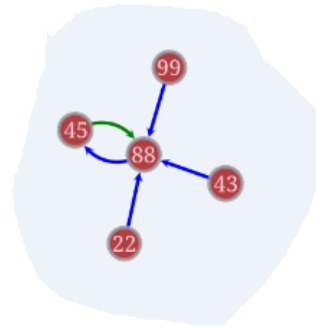
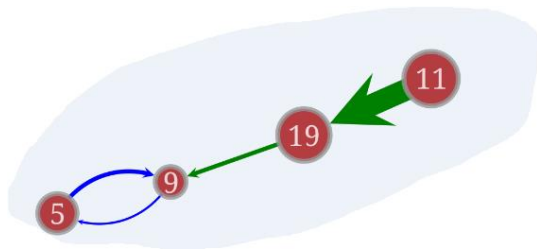
Flows between functional groups and size classes (in Persons Employed)									
<i>In % of total intermediary transactions</i>									
		Intermediary use by							
Intermediary supply by		Starting points		In-between points		Endpoints		Total	
		0-49 PE	>= 50 PE	0-49 PE	>= 50 PE	0-49 PE	>= 50 PE		
Starting points	0-49 PE	4,7	0,9	11,2	2,8	22,3	17,2	59,2	
	>= 50 PE	0,5	0,9	1,3	2,1	5,1	7,8	17,7	
In-between points	0-49 PE	1,6	0,2	4,3	0,6	5,4	2,0	14,1	
	>= 50 PE	0,2	0,2	0,5	0,6	1,5	1,6	4,6	
Endpoints	0-49 PE	0,3	0,0	0,8	0,1	1,2	0,7	3,0	
	>= 50 PE	0,1	0,0	0,3	0,1	0,6	0,5	1,7	
Total		7,3	2,3	18,4	6,3	36,1	29,9		



Examples of detected 'chain structures' (1)



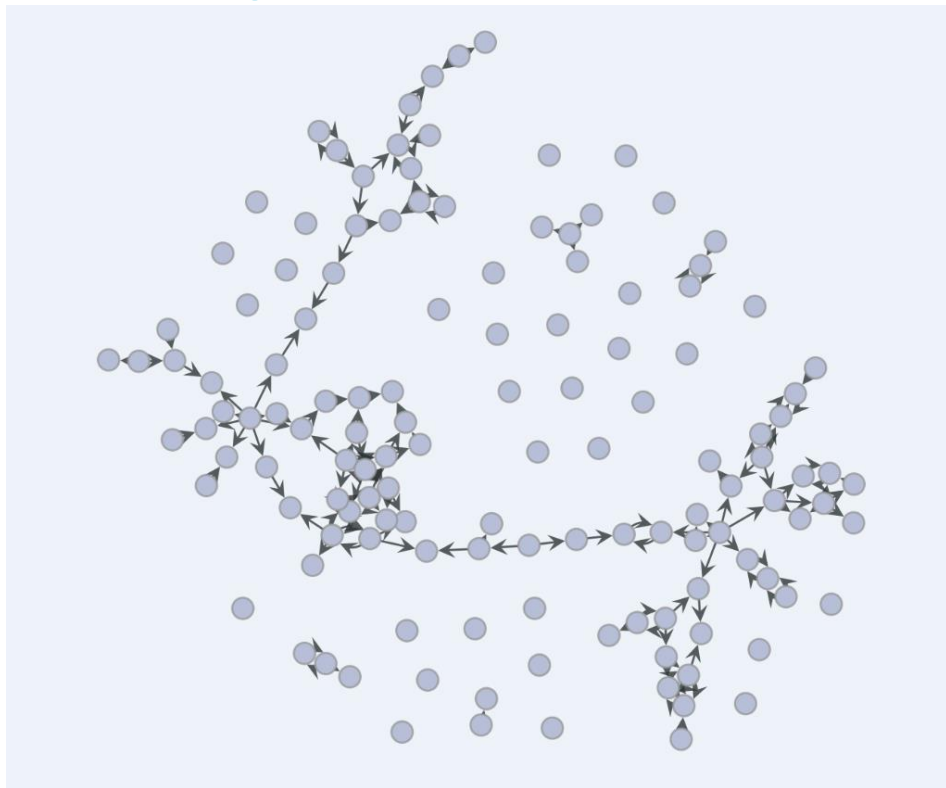
Using Degree-Corrected Stochastic Block Model



Ongoing research by Martijn Gösgens (PhD-student TU Eindhoven)



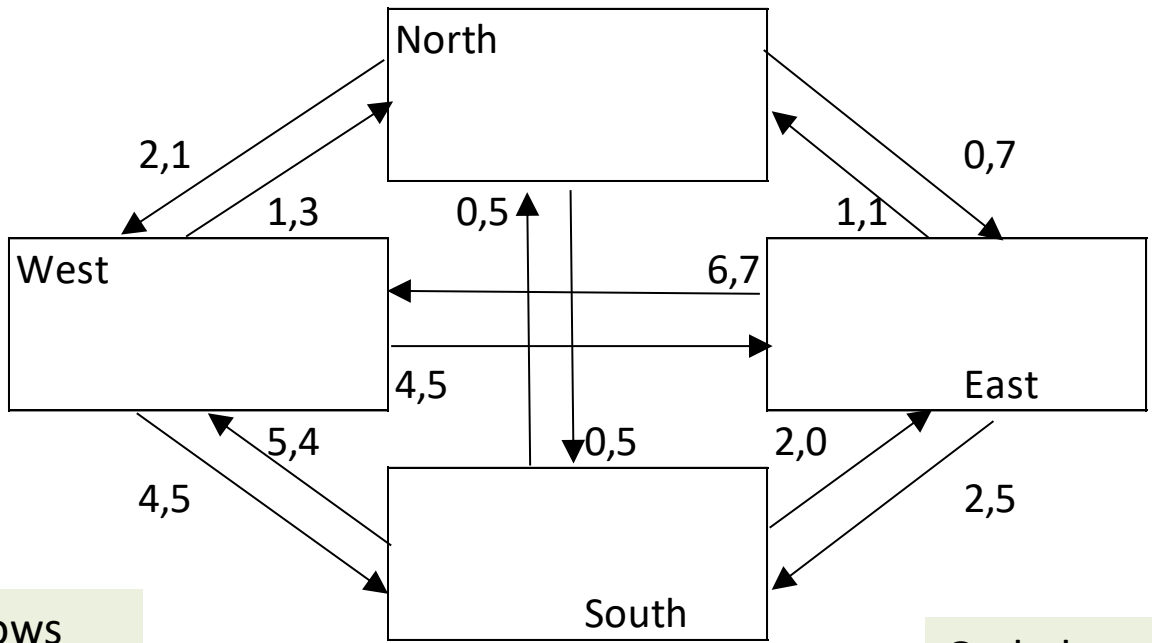
Examples of detected 'chain structures' (2)



Connected 'open triangles' without an up to downstream flow

Conceptually somewhere in between a community (=closed triangles) and a chain (=one way flow)

Flows (in % total intermediate transactions 2018)



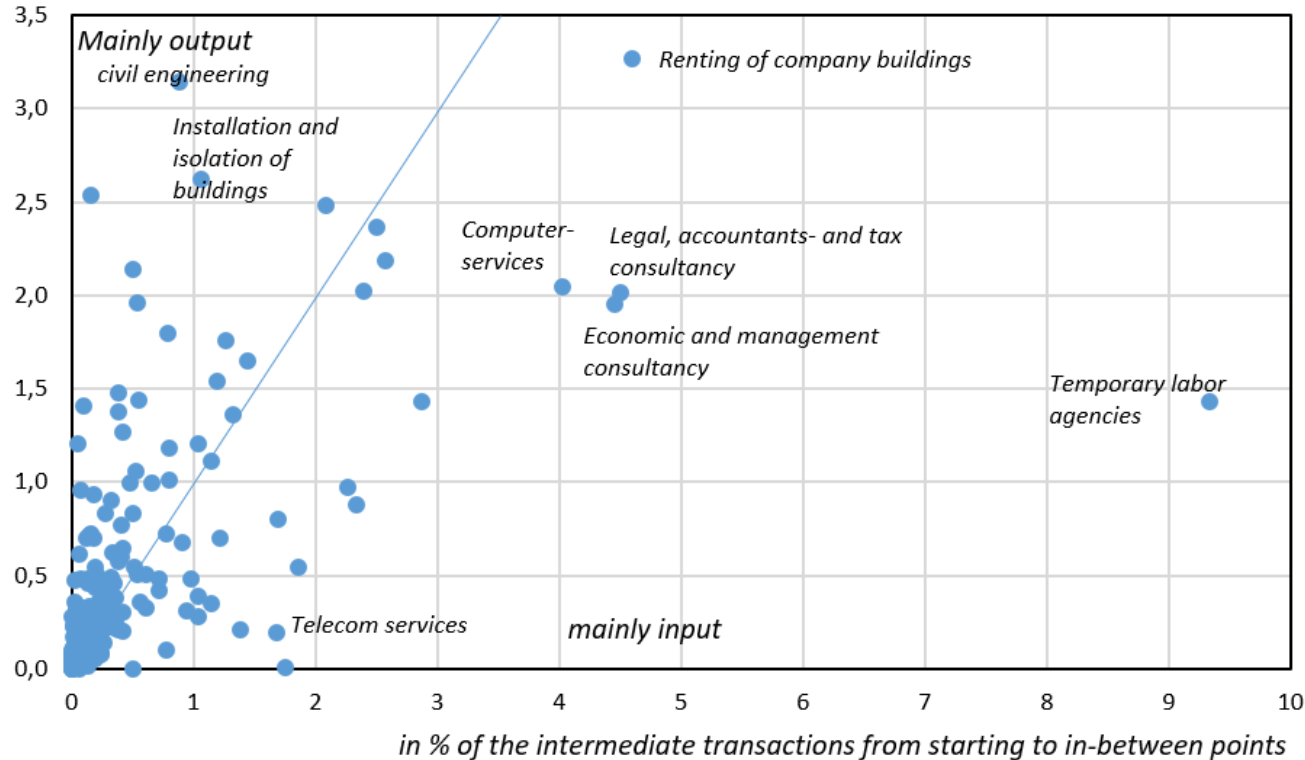
2/3 of the flows remains within these regions

On balance: East is 'upstream' and West 'downstream'



Comparison commodity structure of flows from starting points to in-between points with flows from in-between points to end points

in % of the intermediate transactions from in-between to end points



International collaboration

- An international research community on supply chain network research has been emerging since last year, Statistics Netherlands is part of it
- We collaborate e.g.
 - With the CSH Vienna on the Economic Systemic Risk Index and heterogeneity of industries
 - In testing the approach developed at IIASA on reintegrating trade flows into input/output tables

Dataset available in CBS RA-environment

DSC Webinterface Zoeken Help  

Navigatie Verkorte schrijfwijze ←

Dataontwerpen

Filter op eigenaar:

Filter op koppelvlak:

- + Caribisch Nederland
- + Economie, bedrijven en nationale rekeningen
- + Sociaaleconomische en ruimtelijke statistieken

Variabelen

- + Bedrijfseconomische variabelen
- + Fiscale variabelen
- + Nationale rekeningen
- + Nog in te delen
- + Sociale en ruimtelijke variabelen
- + Veelgebruikte variabelen

Productienetwerk Nederland op bedrijfsniveau met 250 goederengroepen (1-1-2018 - ...)

Eigenaar: EBM Beleids- en managementondersteuning Verkorte schrijfwijze: PNBJJJ_250_VX

Type: Dataontwerp Privacygevoeligheid: Onbekend

Overige versies

Leeg  Download

Beschrijving

Deze 'bèta-publicatie' betreft een experimentele dataset. Feedback van gebruikers over hun ervaringen met de data wordt op prijs gesteld en kan worden gestuurd aan g.buiten@cbs.nl en e.dejonge@cbs.nl.

De publicatie bevat een statistische schatting van het productienetwerk van bedrijven in Nederland. De dataset is ontwikkeld om onderzoek mogelijk te maken naar de structuur van het Nederlandse productienetwerk op bedrijfsniveau, zoals analyse van clusters en ketens en het doorwerken van schokken of veranderingen. Het netwerk beschrijft de zgn. intermediaire leveringen: de klant/leverancierrelaties van goederen en diensten die door de leverancier geproduceerd zijn en door de klant worden gebruikt in het eigen productieproces. De relaties zijn gespecificeerd naar circa 250 goederen- en dienstencategorieën volgens een indeling die gebruikt wordt binnen de Nationale rekeningen.



Other economic RA microdatasets e.g.

- Statistical Business Register (ABR)
- Production statistics
- VAT turnover data (BTW)
- International trade in goods
- Energy use
- Employment
-

Everything with 'BE-number' can be linked to the dataset



