Creation and persistence of inter-firm business ties

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& INNOVATION

ANETLAB | AGGLOMERATION &
SOCIAL NETWORKS
RESEARCH LAB

What’s behind inter-firm business ties?

Source: Scorsese, M. (2013) The Wolf of Wall Street

What’s behind inter-firm business ties?

Firms are embedded in relational structures

Connections can grant power and control

Supply chain position determines firm behaviour and orientation

Evolution of business transactions ties
in large-scale multilayer inter-firm networks

Social connections and functional connections

Social connections — co-ownership ties

similar firms are more likely to be connected
triadic closure supports the embeddedness of firms

Social connections and functional connections

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Functional connections — business transaction ties

complementary production processes

similar companies are competitors

Social connections and functional connections

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Functional connections — business transaction ties

complementary production processes

similar companies are competitors

Do social connections influence the creation and persistence of inter-firm business ties?

Data and network construction

Co-ownership of companies

OPTEN firm information database for Hungary

Focus on all the firms in the database with any co-ownership tie in 2016-2018

OPTEN

KNOWLEDGE IS A TRUSTED PARTNER

Contacts Network

The service provides a clear, graphic representation of the other business interests and history of the owners and managers of the specific company.

Data and network construction

Co-ownership of companies

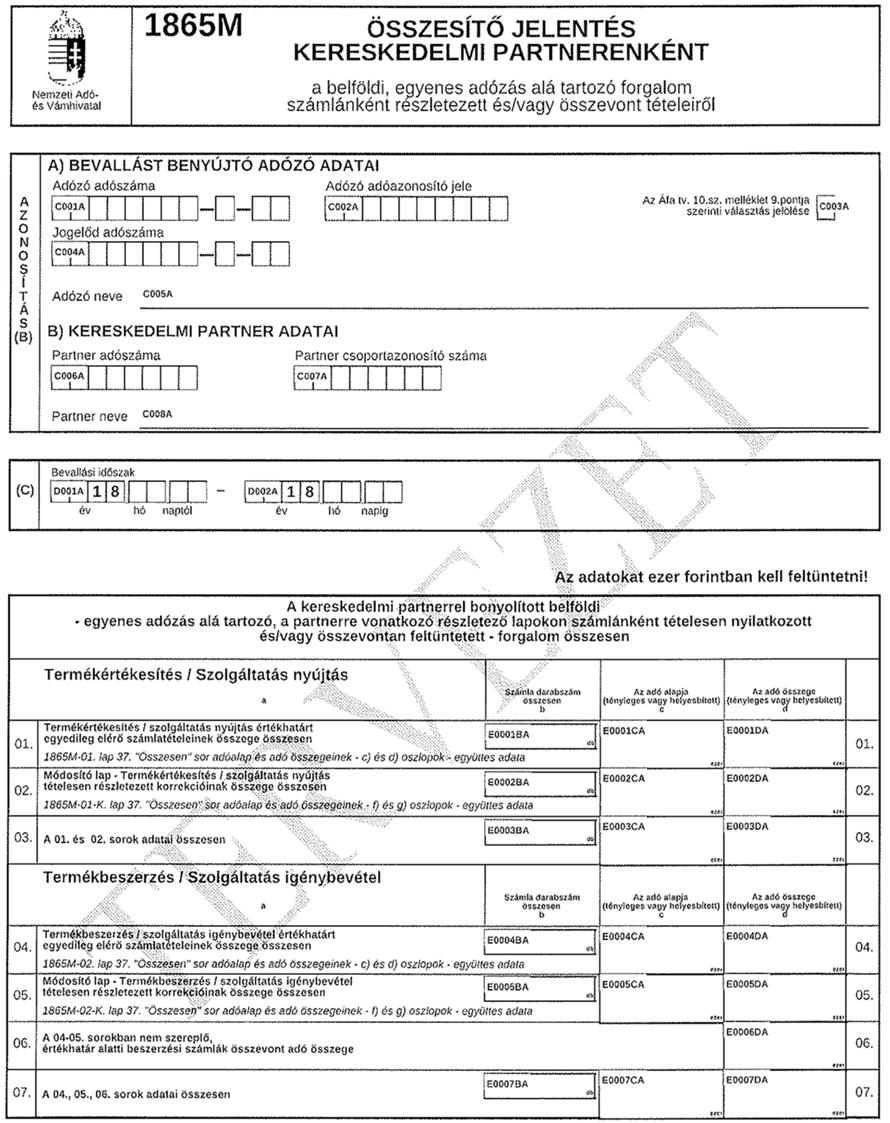
OPTEN firm information database for Hungary

Focus on all the firms in the database with any co-ownership tie in 2016-2018

Business transactions of companies

National Tax and Customs Administration

Detailed VAT records



Nemzeti Adó- és Vámhivatal

1865M ÖSSZESÍTŐ JELENTÉS KERESKEDELMI PARTNERENKÉNT

a belföldi, egyenes adózás alá tartozó forgalom számlánként részletezett és/vagy összevont tételeiről

AZONOSÍTÁS (B)

A) BEVALLÁST BENYÚJTÓ ADÓZÓ ADATAI

Adózó adószáma C001A — Adózó adóazonosító jele C002A

Az Áfa tv. 10.sz. melléklet 9.pontja szerinti választás jelölése C003A

Jogelőd adószáma C004A

Adózó neve C005A

B) KERESKEDELMI PARTNER ADATAI

Partner adószáma C006A — Partner csoportazonosító száma C007A

Partner neve C008A

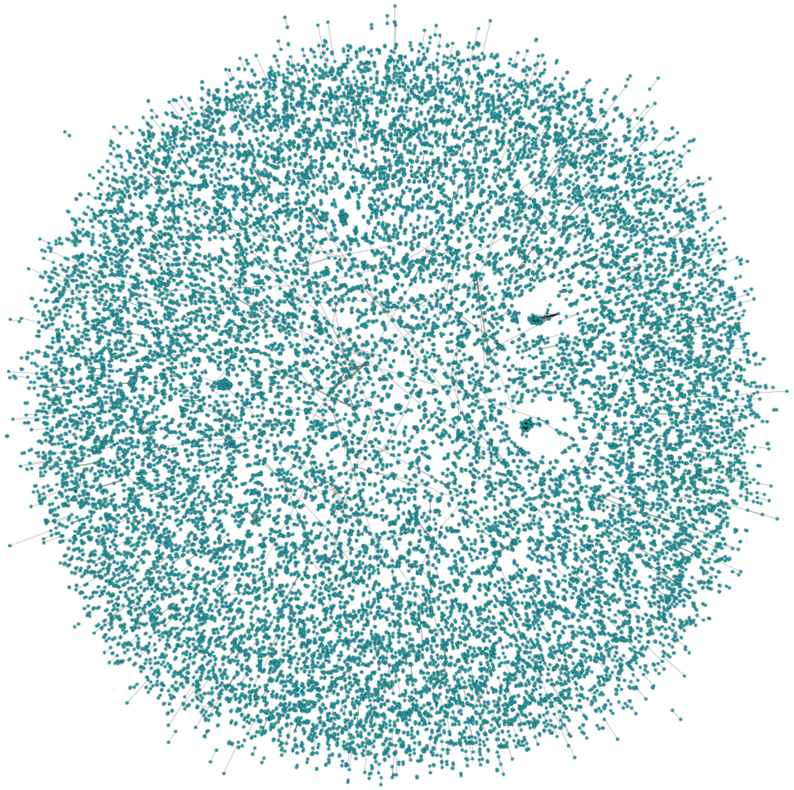
(C) Bevallási időszak D001A 18 [év][hó][naptól] – D002A 18 [év][hó][napig]

Az adatokat ezer forintban kell feltüntetni!

A kereskedelmi partnerrel bonyolított belföldi
- egyenes adózás alá tartozó, a partnerre vonatkozó részletező lapokon számlánként tételesen nyilatkozott és/vagy összevontan feltüntetett - forgalom összesen

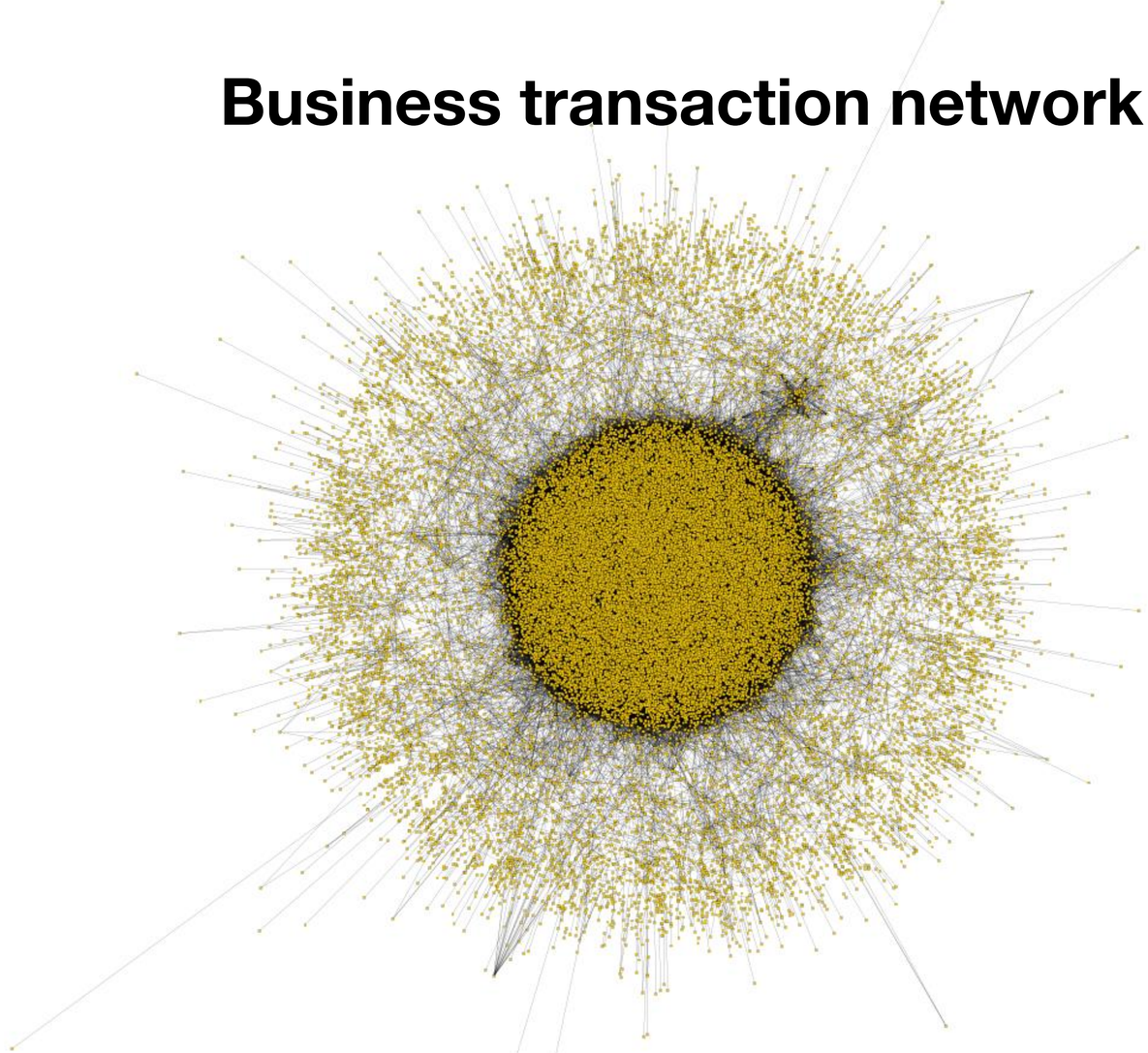
	Termékértékesítés / Szolgáltatás nyújtás (a)	Számla darabszám összesen (b)	Az adó alapja (tényleges vagy helyesbített) (c)	Az adó összege (tényleges vagy helyesbített) (d)	
01.	Termékértékesítés / szolgáltatás nyújtás értékhatárt egyedileg elérő számlatételeinek összege összesen *1865M-01. lap 37. "Összesen" sor adóalap és adó összegeinek - c) és d) oszlopok - együttes adata*	E0001BA db	E0001CA ezer	E0001DA ezer	01.
02.	Módosító lap - Termékértékesítés / szolgáltatás nyújtás tételesen részletezett korrekcióinak összege összesen *1865M-01-K. lap 37. "Összesen" sor adóalap és adó összegeinek - f) és g) oszlopok - együttes adata*	E0002BA db	E0002CA ezer	E0002DA ezer	02.
03.	A 01. és 02. sorok adatai összesen	E0003BA db	E0003CA ezer	E0003DA ezer	03.
	Termékbeszerzés / Szolgáltatás igénybevétel (a)	Számla darabszám összesen (b)	Az adó alapja (tényleges vagy helyesbített) (c)	Az adó összege (tényleges vagy helyesbített) (d)	
04.	Termékbeszerzés / szolgáltatás igénybevétel értékhatárt egyedileg elérő számlatételeinek összege összesen *1865M-02. lap 37. "Összesen" sor adóalap és adó összegeinek - c) és d) oszlopok - együttes adata*	E0004BA db	E0004CA ezer	E0004DA ezer	04.
05.	Módosító lap - Termékbeszerzés / szolgáltatás igénybevétel tételesen részletezett korrekcióinak összege összesen *1865M-02-K. lap 37. "Összesen" sor adóalap és adó összegeinek - f) és g) oszlopok - együttes adata*	E0005BA db	E0005CA ezer	E0005DA ezer	05.
06.	A 04-05. sorokban nem szereplő, értékhatár alatti beszerzési számlák összevont adó összege			E0006DA ezer	06.
07.	A 04., 05., 06. sorok adatai összesen	E0007BA db	E0007CA ezer	E0007DA ezer	07.

Co-ownership network



	Nodes	Edges	Transitivity
2016	27671	21139	0.723
2017	33919	26581	0.731
2018	41210	33757	0.725

Business transaction network

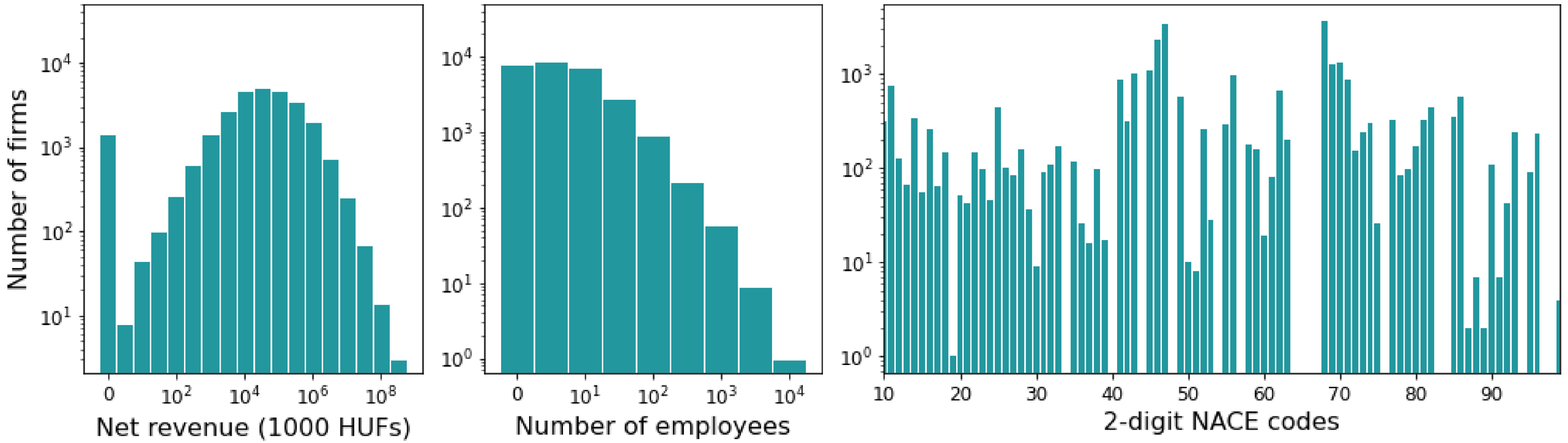


	Nodes	Edges	Transitivity
2016	97031	238043	0.007
2017	117752	277385	0.007
2018	87837	190143	0.008

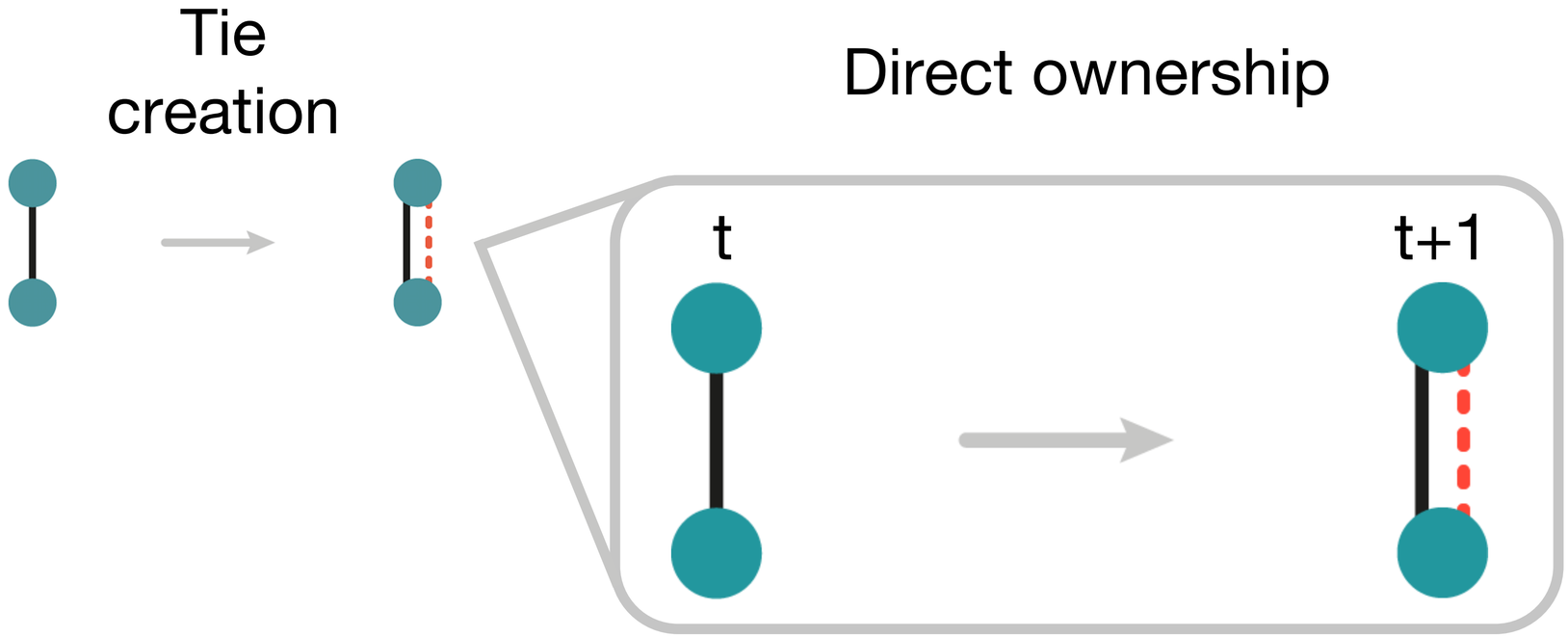
	Co-ownership ties	Transactions ties	Overlap
2016	21139	8863	1311
2017	26581	9391	1456
2018	33757	7583	1567
2016-2017	21139	4232	-
2017-2018	26548	3868	-
2016-2017-2018	21108	1137	-

Business transactions between firms present in the co-ownership network at any point in time between 2016-2018

Sample of firms



Network motifs behind business ties

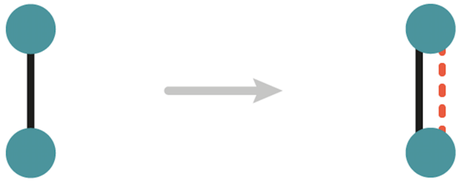


Observed	
2016	2017
19828	25125
(0.003%)	(0.002%)

Co-ownership ties Business transaction

Network motifs behind business ties

Tie creation



Direct ownership

Tie persistence

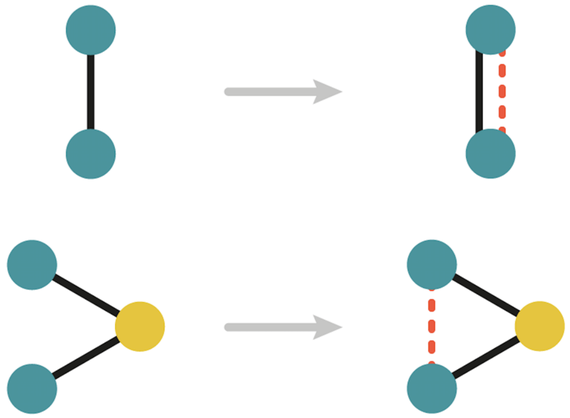
Observed	
2016	2017
1311	1456
(14.792%)	(15.504%)

Co-ownership ties

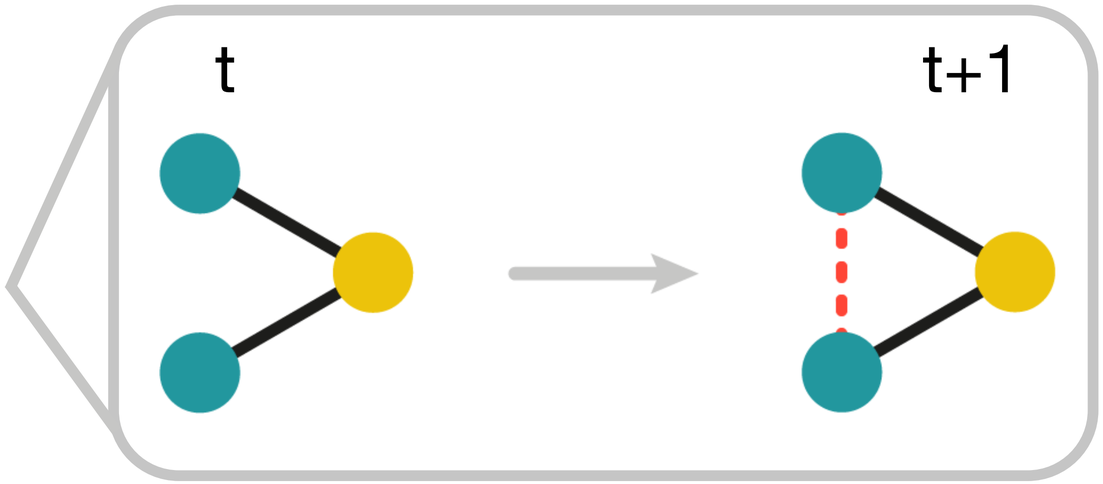
Business transaction

Network motifs behind business ties

Tie creation



Indirect ownership



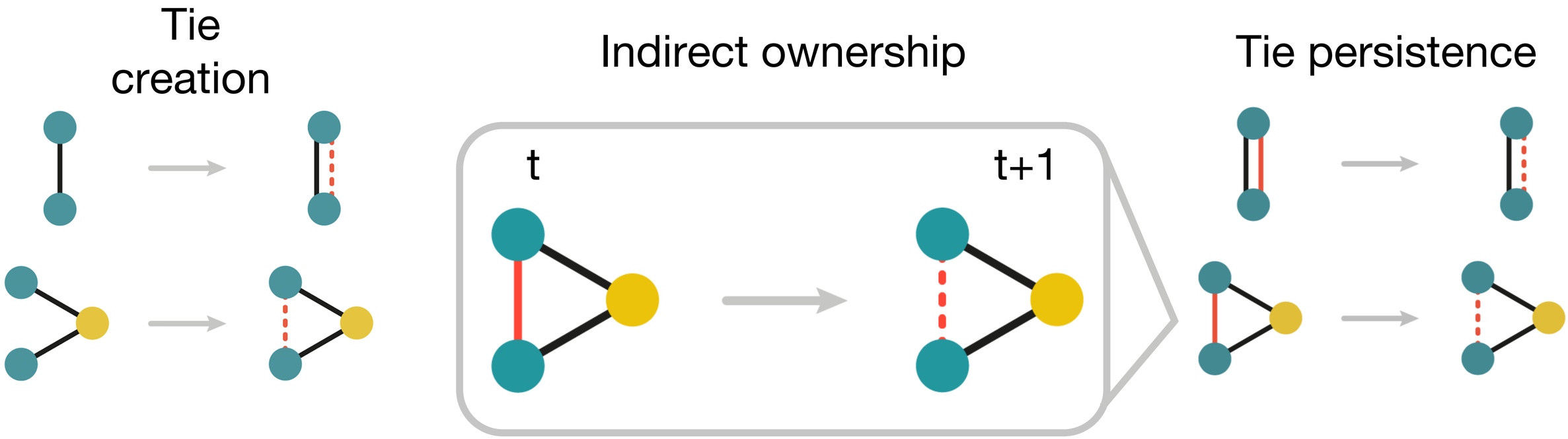
Tie persistence

Observed	
2016	2017
5527	6592
(0.001%)	(0.001%)

Co-ownership ties

Business transaction

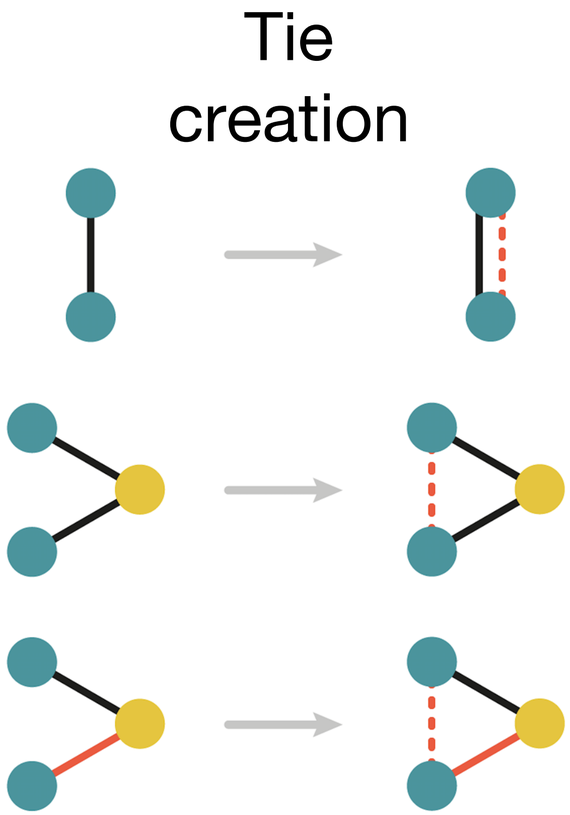
Network motifs behind business ties

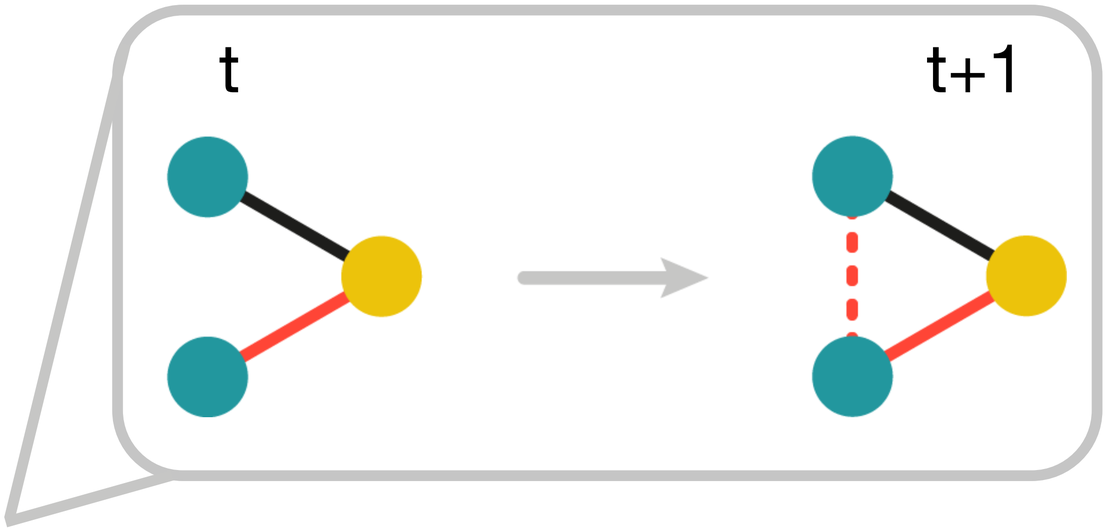


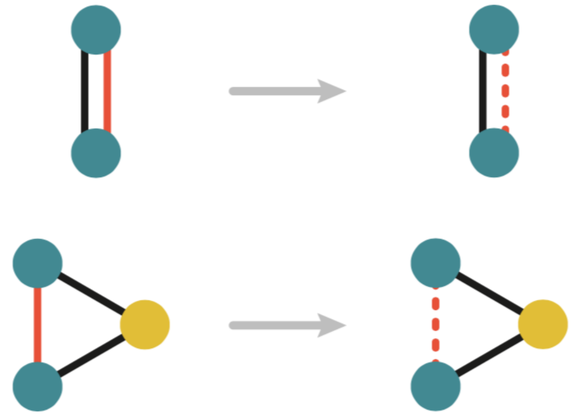
Observed	
2016	2017
77	95
(0.869%)	(1.012%)

Co-ownership ties Business transaction

Network motifs behind business ties





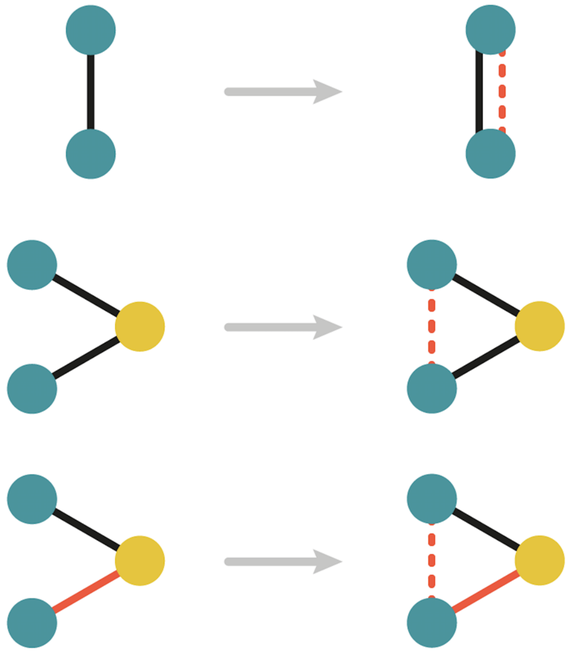


Observed	
2016	2017
22232	27092
(0.003%)	(0.002%)

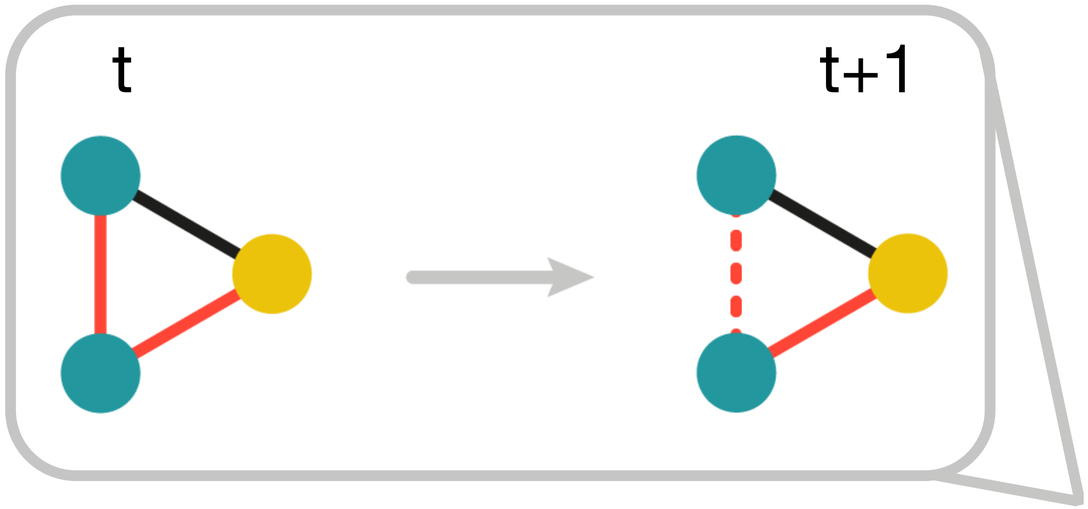
Co-ownership ties Business transaction

Network motifs behind business ties

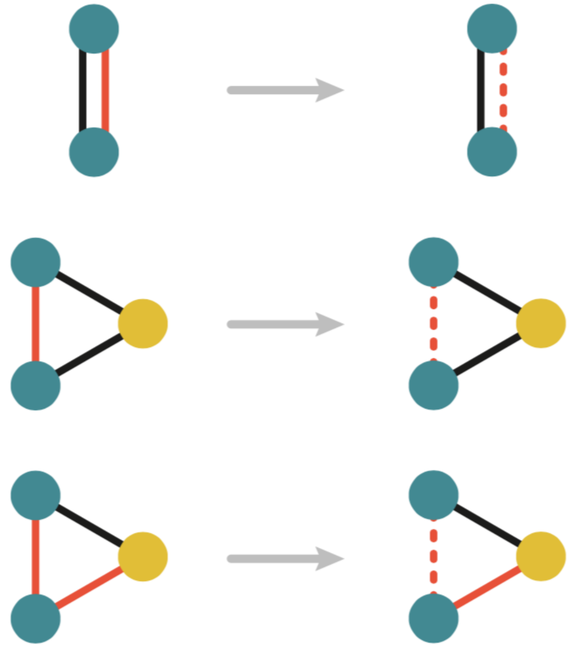
Tie creation



Indirect mixed



Tie persistence



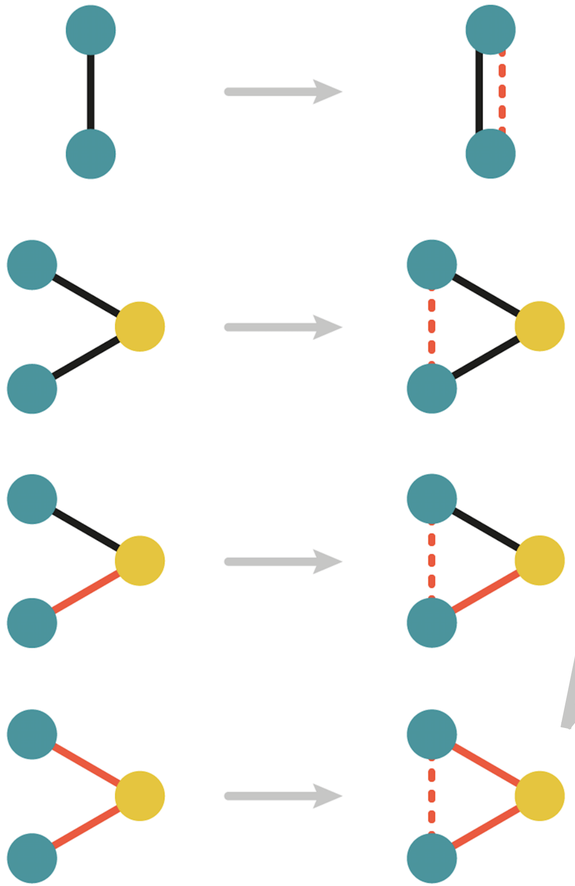
Observed	
2016	2017
1232	1369
(13.900%)	(14.578%)

Co-ownership ties

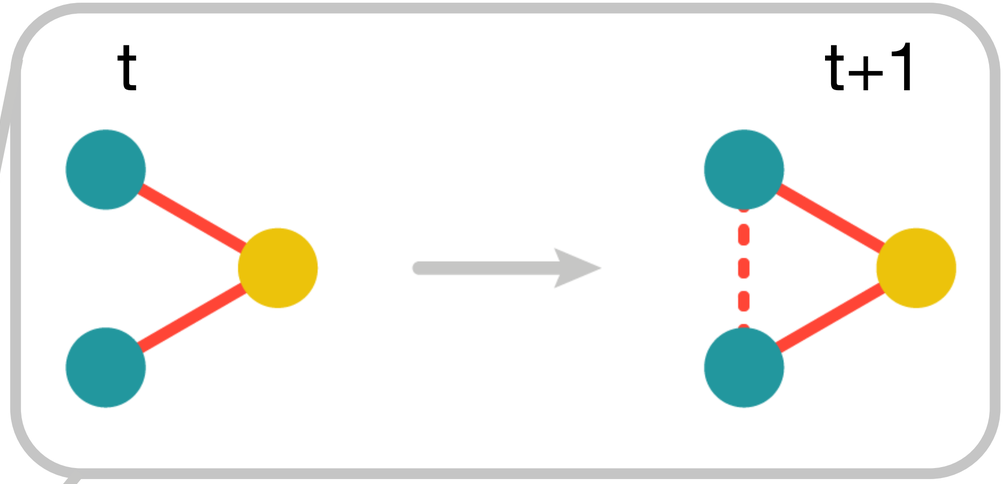
Business transaction

Network motifs behind business ties

Tie creation

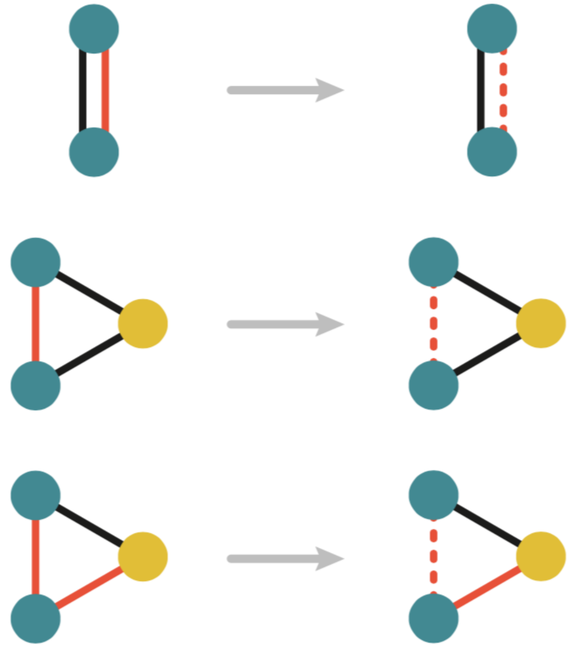


Indirect transactions



Observed	
2016	2017
791497	847310
(0.103%)	(0.074%)

Tie persistence

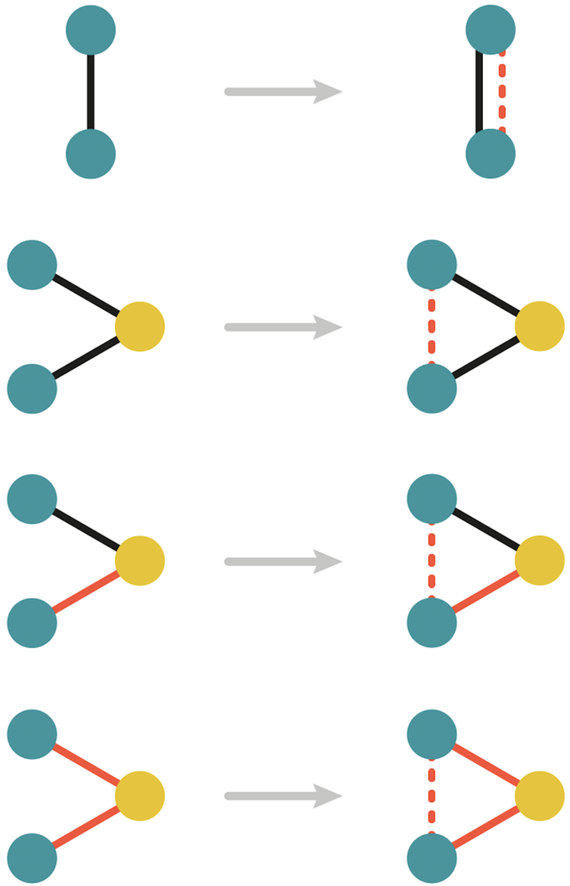


Co-ownership ties

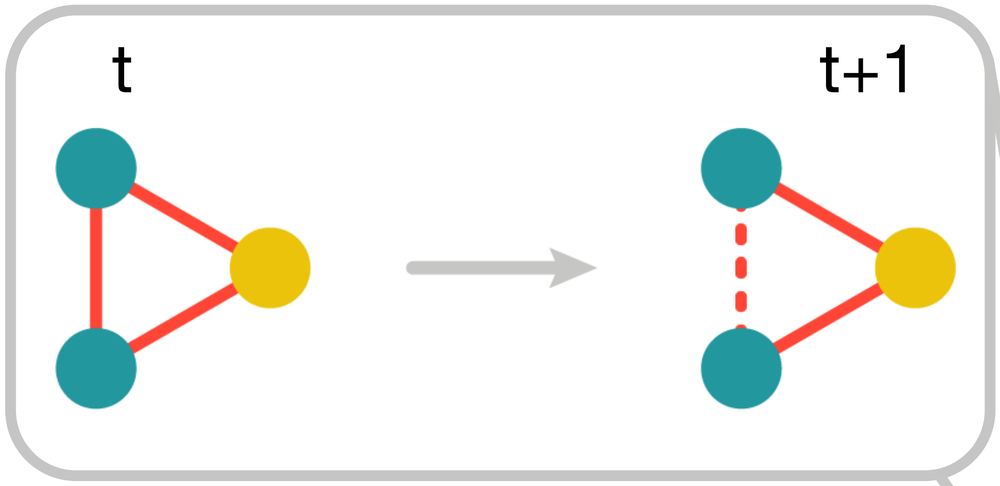
Business transaction

Network motifs behind business ties

Tie creation

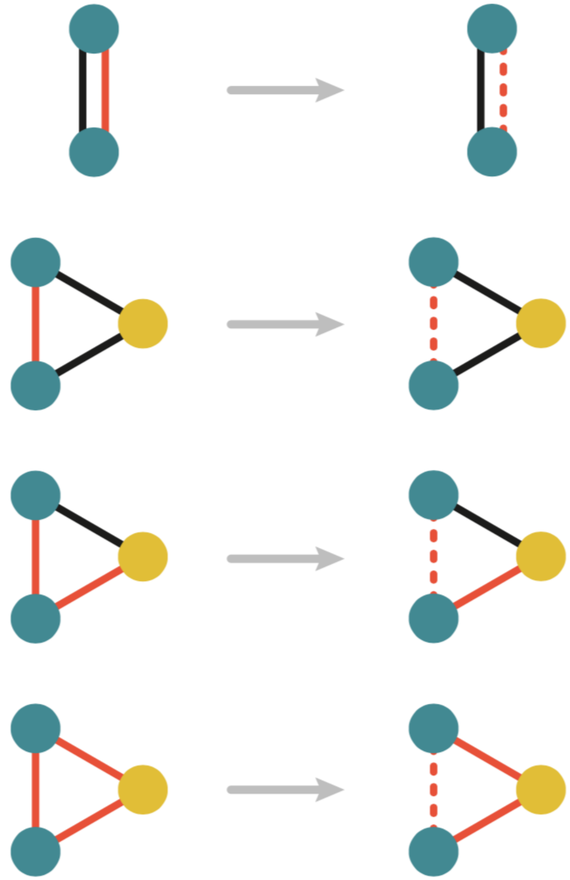


Indirect transactions



Observed	
2016	2017
4095	4355
(46.203%)	(46.374%)

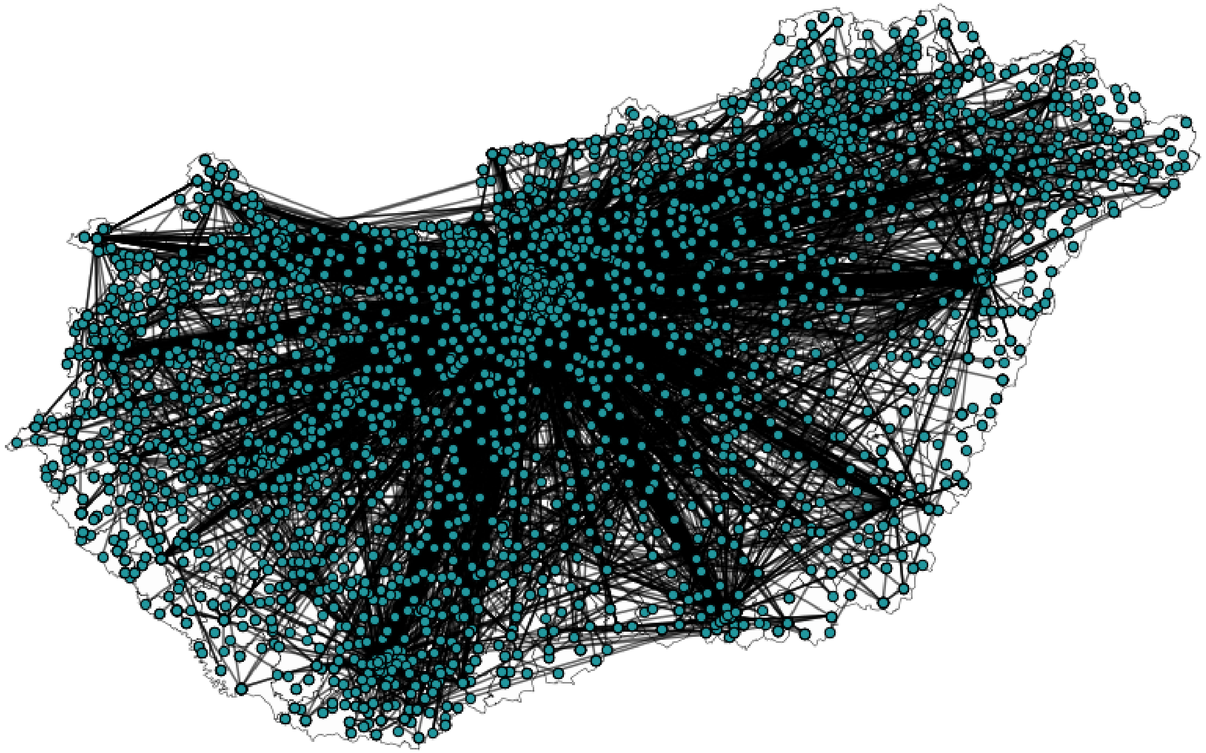
Tie persistence



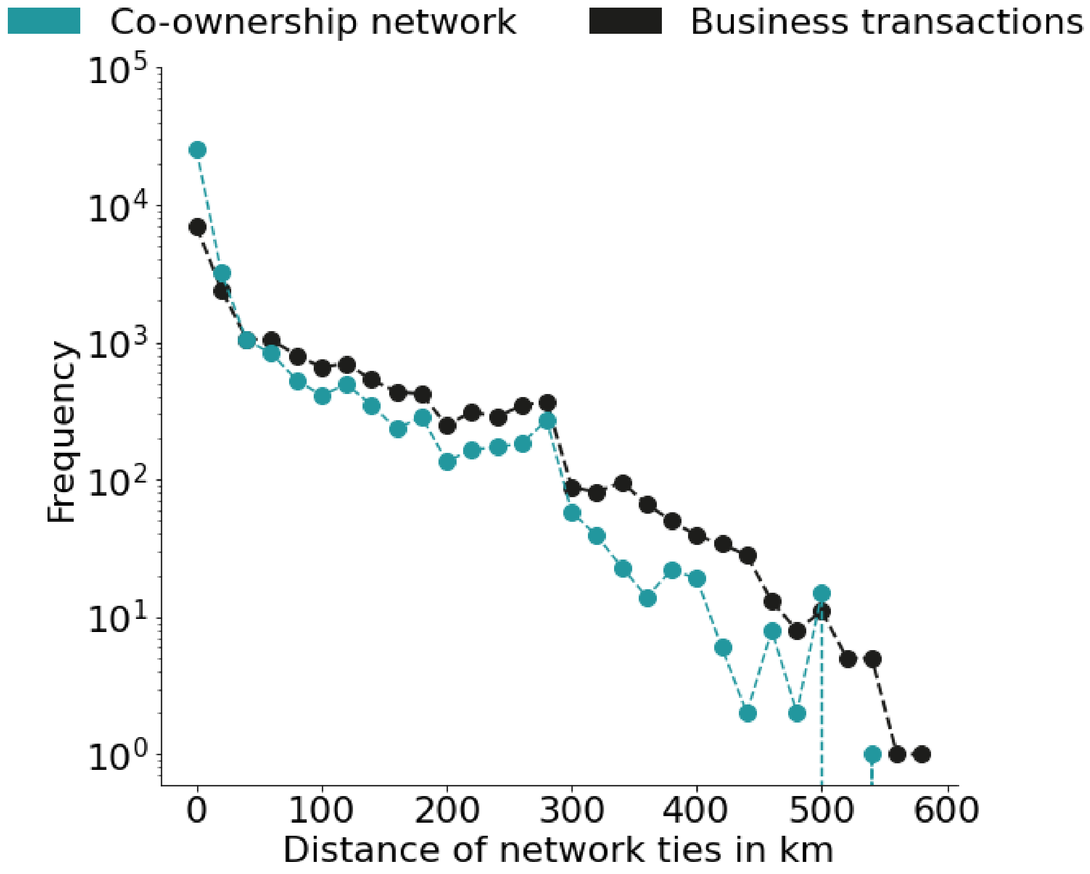
Co-ownership ties

Business transaction

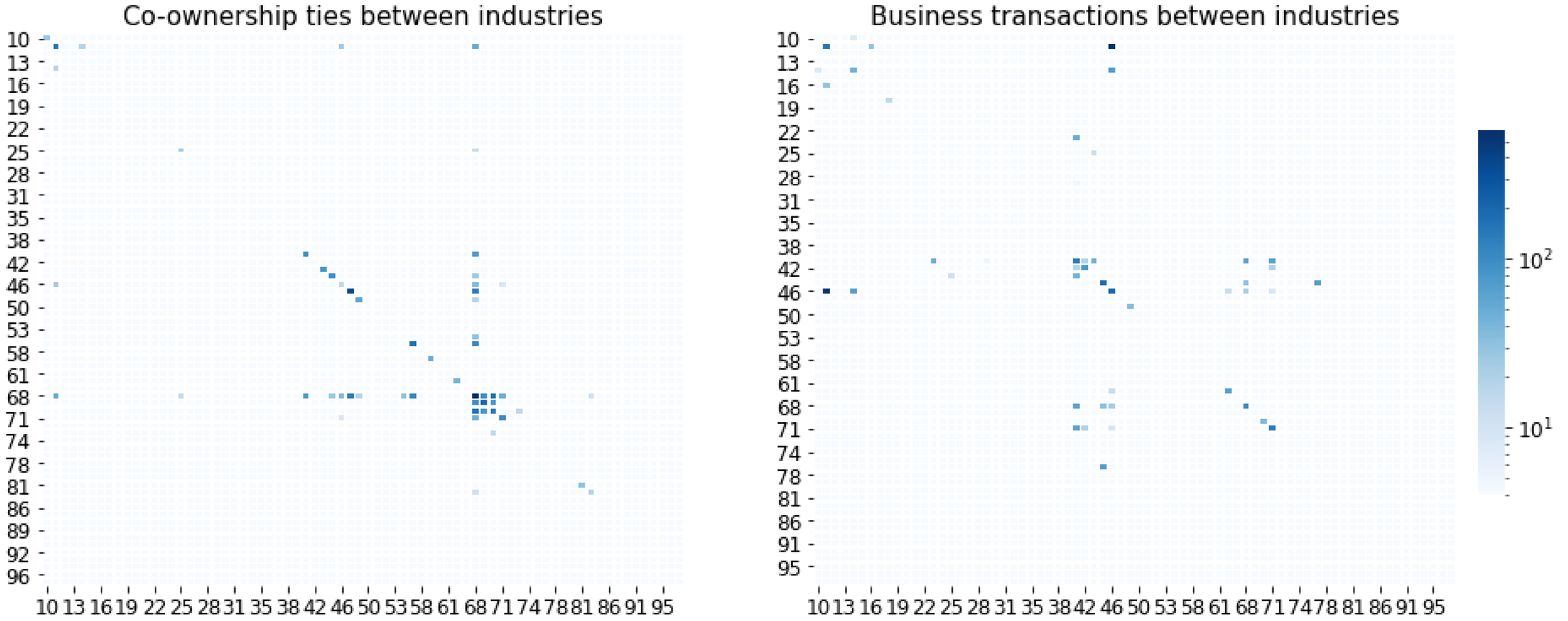
Further mechanisms — geography



Co-ownership network 2016



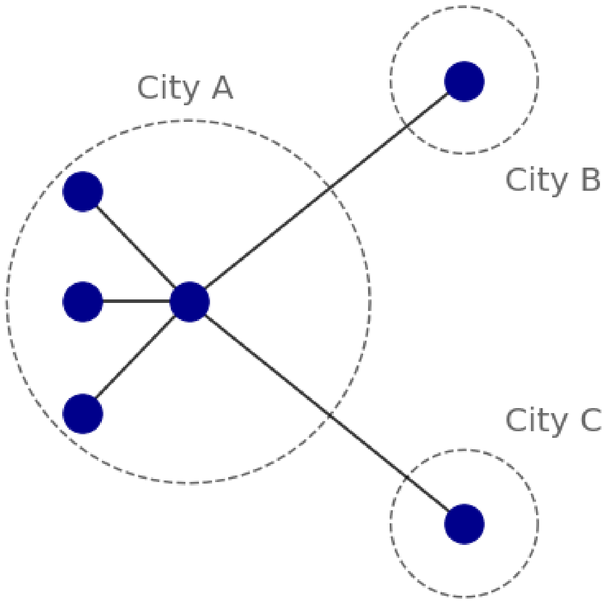
Further mechanisms — similarity of industries



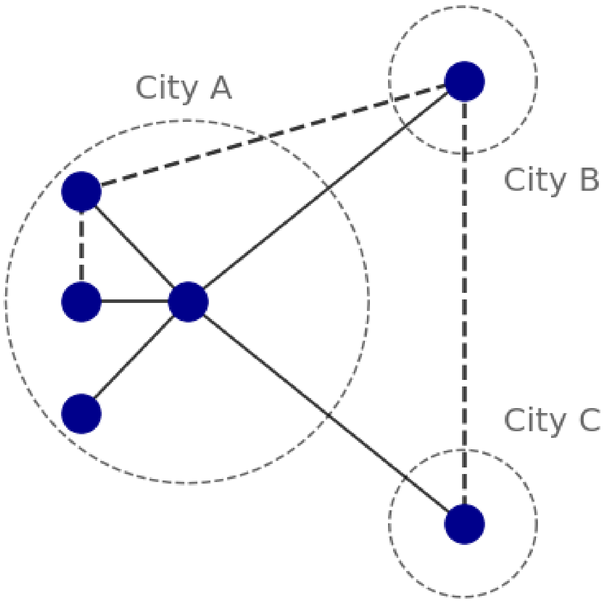
Creation of new business ties

Log-linear models — EXAMPLE

period t



period t+1



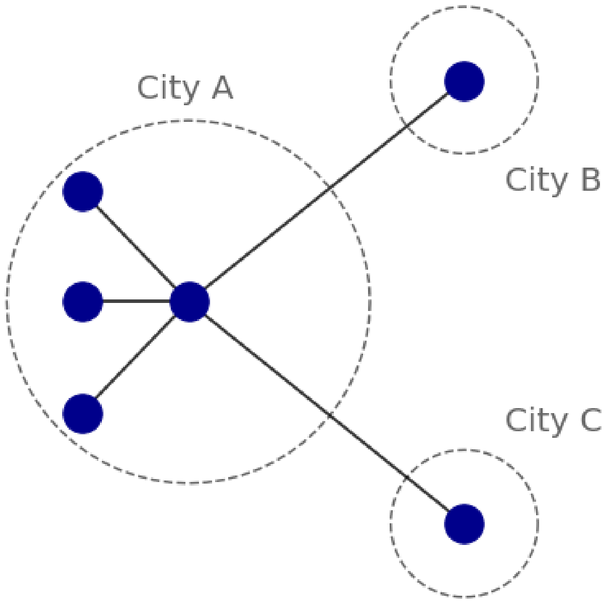
		Same city		
		1	0	Total
New tie	1	1	2	3
	0	2	5	7
	Total	3	7	10

$$\log m = \lambda + \lambda^{n} + \lambda^{c} + \lambda^{nc}$$

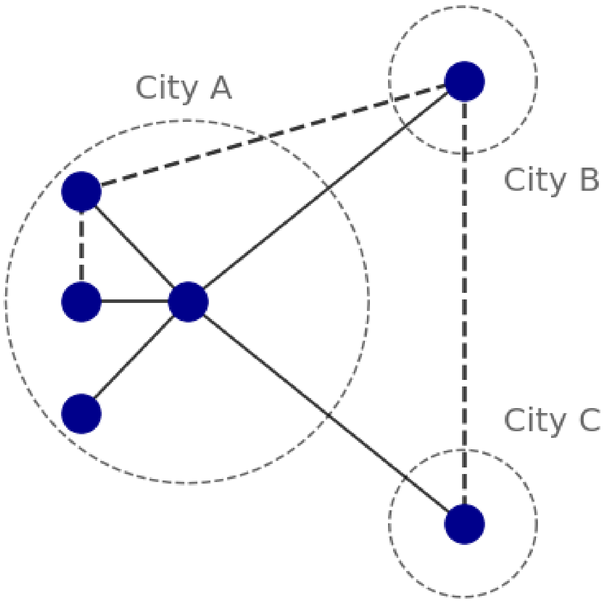
Creation of new business ties

Log-linear models — EXAMPLE

period t



period t+1



		Same city		
		1	0	Total
New tie	1	1	2	3
	0	2	5	7
	Total	3	7	10

$$\log m = \lambda + \lambda^{n} + \lambda^{c} + \lambda^{nc}$$

Creation of new business ties

Variables							Predicted cases	
New business tie (2017)	Direct ownership (2016)	Indirect ownership (2016)	Indirect transaction (2016)	Indirect mixed (2016)	Same city	Observations	Main effects model	2-way interactions model
0	0	0	0	0	0	2021	3704	2463
0	0	0	0	0	1	173	6	49
0	0	0	1	0	0	820	2	690
0	0	0	1	0	1	54	0	50
0	0	0	0	1	0	68	0	0
0	0	0	0	1	1	13	0	0
0	0	0	1	1	0	93	0	1
0	0	0	1	1	1	13	0	0
0	0	1	0	0	0	3	0	1
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.

Creation of new business ties

- Log-linear model parameter estimates with all two-way interactions

Parameter	Estimate	SE	Parameter	Estimate	SE
Business tie (2017) X			Business tie (2018) X		
Direct ownership (2016)	4.300***	(0.124)	Direct ownership (2017)	5.693***	(0.124)
Indirect ownership (2016)	2.239***	(0.259)	Indirect ownership (2017)	3.887***	(0.239)
Indirect transaction (2016)	5.979***	(0.034)	Indirect transaction (2017)	5.778***	(0.042)
Indirect mixed (2016)	-1.579***	(0.125)	Indirect mixed (2017)	-2.137***	(0.106)
Same city	2.815***	(0.064)	Same city (log)	2.199***	(0.099)
Same industry 2-digit	0.886***	(0.043)	Same industry 2-digit	0.828***	(0.052)
Same industry 4-digit	-1.651***	(0.047)	Same industry 4-digit	-1.551***	(0.053)

Source: Authors' own construction
Note: Standard errors in parentheses, * p<0.01, ** p<0.001, *** p<0

Persistence of business transactions

Logit models
in a gravity model setting

	Business tie persistence (2016-2017)			Business tie persistence (2017-2018)		
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Distance (log)	-0.380***	-0.253***	-0.237***	-0.329***	-0.189***	-0.239***
	(0.027)	(0.029)	(0.029)	(0.027)	(0.028)	(0.031)
Direct ownership		1.111***	1.049***		1.067***	1.187***
		(0.072)	(0.074)		(0.069)	(0.072)
Indirect ownership			0.990***			0.941***
			(0.277)			(0.233)
Indirect mixed			0.456***			0.430***
			(0.070)			(0.070)
Indirect transaction			0.291***			0.307***
			(0.050)			(0.054)
Same industry	0.292***	0.248***	0.189**	0.307***	0.248	0.075
2-digit	(0.071)	(0.072)	(0.073)	(0.072)	(0.072)	(0.076)
Same industry	0.218*	0.185*	0.164	0.176	0.116***	0.317***
4-digit	(0.091)	(0.092)	(0.093)	(0.091)	(0.092)	(0.095)
Firm size (i)	0.386***	0.448***	0.394***	0.321***	0.382***	0.498***
	(0.206)	(0.029)	(0.030)	(0.188)	(0.025)	(0.032)
Firm size (j)	0.367***	0.434***	0.389***	0.277***	0.330***	0.362***
	(0.029)	(0.030)	(0.031)	(0.025)	(0.026)	(0.032)
Size difference	-0.033	-0.030	-0.020	0.120***	0.141	0.062
	(0.033)	(0.034)	(0.034)	(0.028)	(0.028)	(0.037)
(Intercept)	-4.266***	-5.349***	-4.950***	-3.797	-4.830***	-6.126
	(0.206)	(0.224)	(0.234)	(0.188)	(0.205)	(0.258)
AIC	11616	11370	11255	11967	11725	10474

Source: Authors' own construction

Note: log-odds parameters, standard errors in parentheses, * p<0.01, ** p<0.001, *** p<0

Discussion

Direct and indirect ownership ties contribute to the creation and persistence of inter-firm business transactions

Multi-level connections of companies explain business relationship

Geographic and technological proximity enhances inter-firm transactions

Social connections influence and function network ties

Thank you!

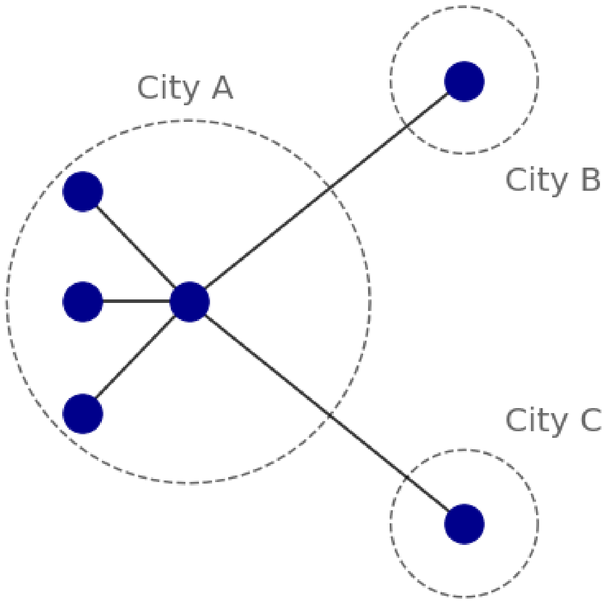
László Lőrincz, *Sándor Juhász*, Rebeka O. Szabó

sandorjuhasz.com

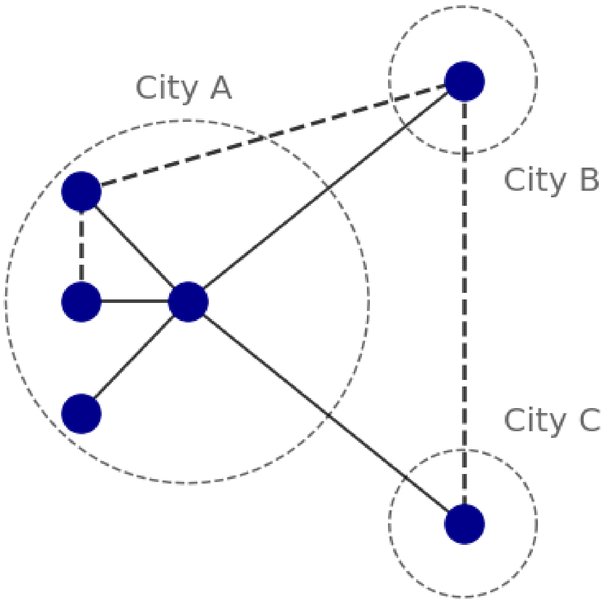
Creation of new business ties

Log-linear models — EXAMPLE

period t



period t+1



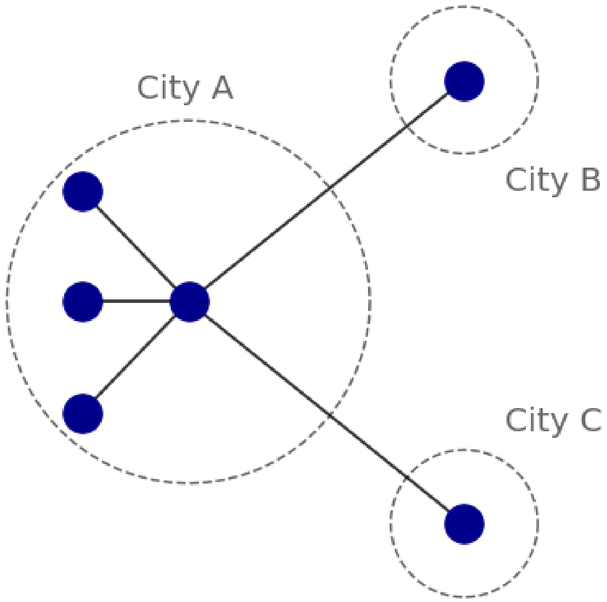
New tie	Same city	Observations
1	1	1
1	0	2
0	1	2
0	0	5

$$\log m = \lambda + \lambda^{n} + \lambda^{c} + \lambda^{nc}$$

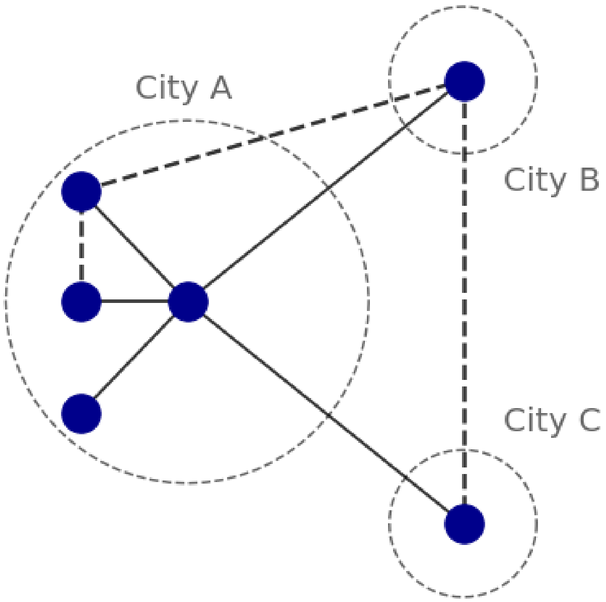
Creation of new business ties

Log-linear models — EXAMPLE

period t



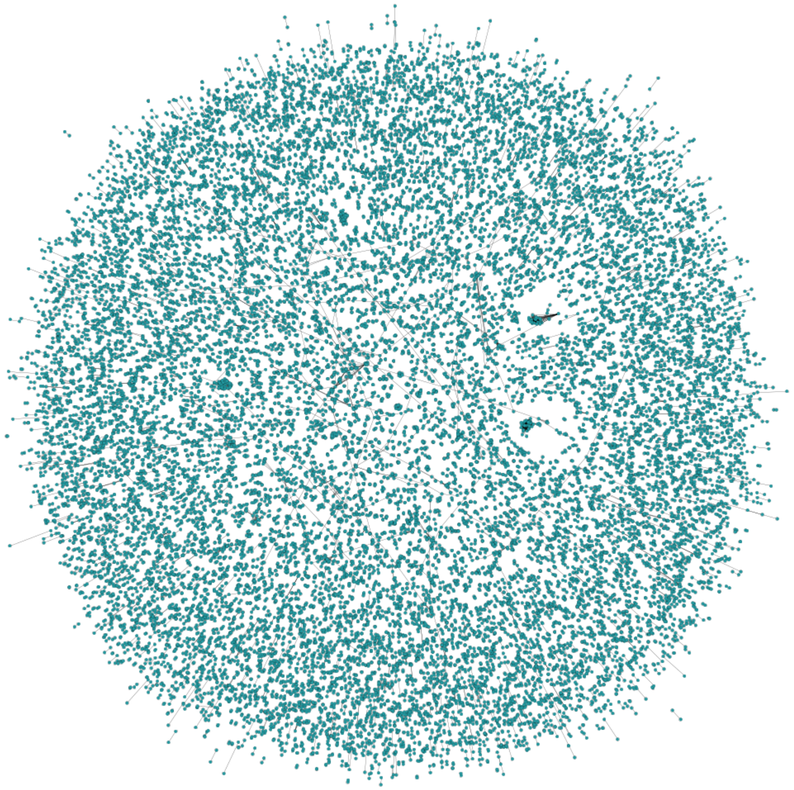
period t+1



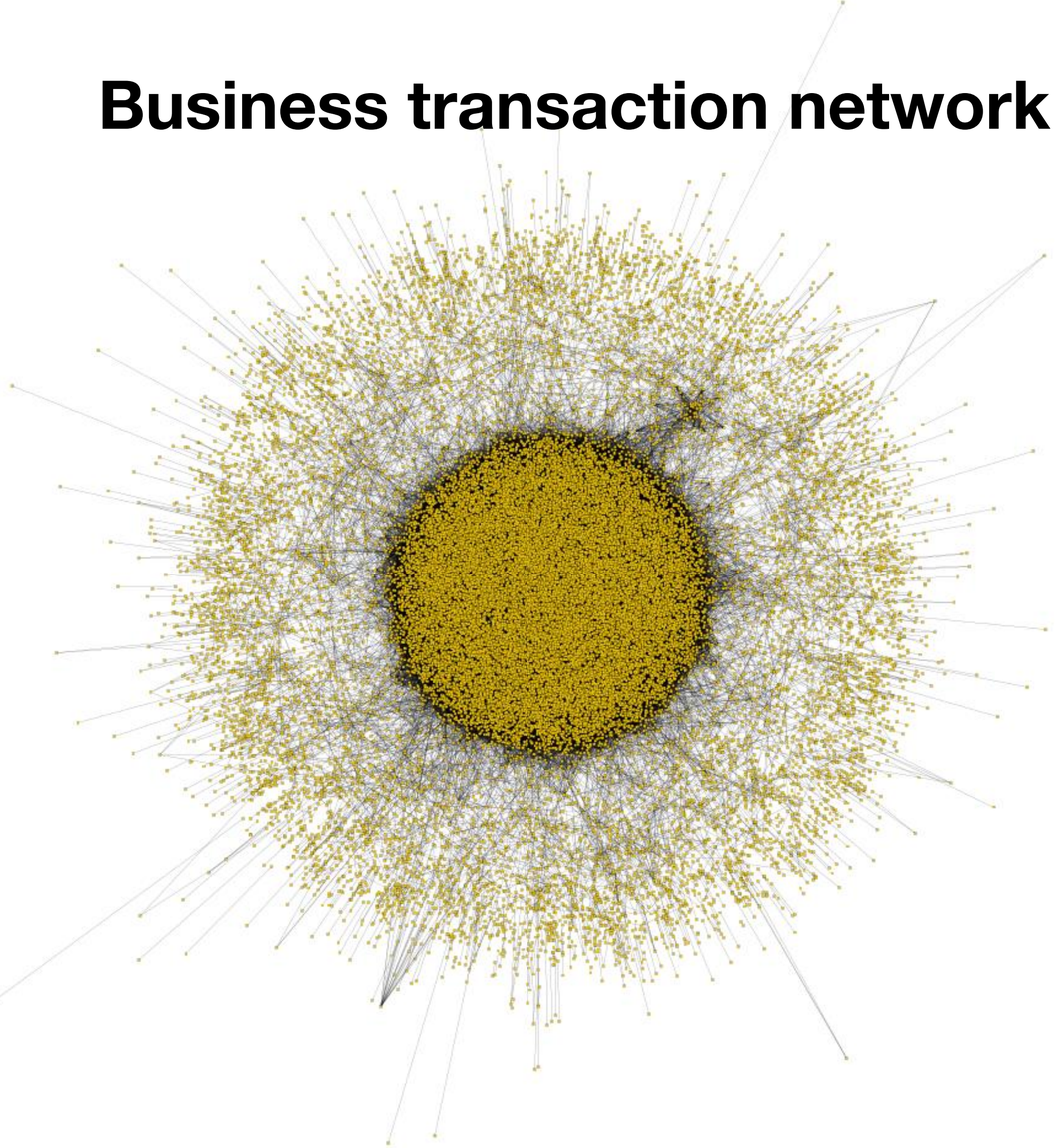
New tie	Same city	Observations
1	1	1
1	0	2
0	1	2
0	0	5

$$\log m = \lambda + \lambda^{n} + \lambda^{c} + \lambda^{nc}$$

Co-ownership network



Business transaction network



	Co-ownership	Transactions	Overlap
2016	21139	8863	1311
2017	26581	9391	1456
2018	33757	7583	1567
2016-2017	21139	4232	-
2017-2018	26581	3393	-

Business transactions between firms present in the co-ownership network at any point in time between 2016-2018