Diversity and Discrimination in the Classroom

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Motivation

Public education is one of the few social institutions that have the potential to bring children and youth together across ethnic, racial, and social lines

Could this prepare youth to succeed in an increasingly diverse society?

A priori unclear

- **Polarization**: In settings dominated by a few large groups, the drive to establish cultural domination could grow strong, causing own-group attachment to increase and integration to decrease
- **Fractionalization**: With many small groups, benefits could be gained by unifying under a shared identity, which in turn would ultimately foster social cohesion

Key Questions

The opposing forces of polarization and fractionalization have been explored in the context of nation and community-building in the developing world (Esteban & Ray 1994; Montalvo & Reynal-Querol 2005; Bazzi et al. 2019)

We apply the fractionalization-polarization paradigm to diverse schools and classrooms in Germany

Research questions:

- Does the type of diversity that prevails in schools matter for social cohesion?
- Is in-group bias more prevalent in polarized classrooms than in homogeneous or fractionalized classrooms?
- Does the cultural distance between majority and minority groups matter?
- What role do statistical and taste discrimination play, and what about stereotypes?

Challenges:

Data: Measuring in-group bias among adolescents and studying polarization and fractionalization cannot be done with existing datasets

Selection bias: Interaction with ethnically diverse peers is endogeneous

Solutions:

Data: Conduct a large, incentivized lab-in-the field experiment in 220 classes spread across 57 German secondary schools

- Investment ("trust" game) to measure how native German students cooperate with in-group (other natives) versus out-group (immigrant) partners
- Survey to characterize the ethnic composition of a classroom

Identification: Exploit variation in peer group diversity arising from students' quasi-random assignment to classes within schools

Related literature

We contribute to the literature on ...

- societal challenges related to ethnic diversity and the **debate between polarization versus fractionalization**:
  - at the macro-level (e.g., Alesina and La Ferrara, 2005; Montalvo and Reynal-Querol, 2005)
  - at the micro-level (e.g., Algan et al., 2016; Bazzi et al., 2019)
- **immigration and xenophobia** (e.g., Barone et al., 2016; Halla et al., 2017; Dustmann et al., 2018; Edo et al., 2019; Steinmayr, 2021)
- **ethnic peers in the educational context**
  - academic achievement (Ohinata and van Ours, 2013 & 2016)
  - social cohesion (Boisjoly et al., 2006; Alan et al., 2021; Boucher et al., 2022; Corno et al., 2022;)

Data

Our data collection

- collaborated with educational authorities in 2 German states (NRW & SH),
- collected data for **57 schools (in 8 cities)**,
- targeted all 9^{th}/ 10^{th} **graders (220 classes)**,

  – 4,634 students out of which 4,094 provided complete information (1% of the parents and 3.5% of the students opted out, 7% did not complete the survey)

  – **2,257 native students** and **1,837 immigrant students** (at least one parent born abroad)
- combined

  (i) a **survey** to determine students' ethnic background plus other variables

  (ii) an **incentivized experiment** to elicit students' in-group out-group bias

Ethnic Diversity

The survey contained questions on parents' country of birth and student's religion allowing us to create measures for the ethnic composition of the classroom:

1. **Intergroup diversity**:

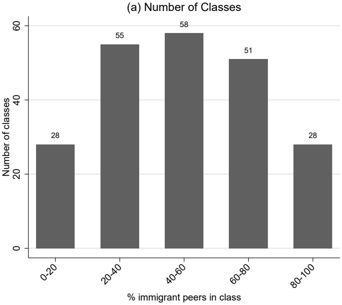
= Share of immigrant peers (at least one parent born abroad) per class (leave-one-out share: mean= 0.38; std. dev.= 0.21) Distribution

2. **Intra-group diversity**: Distribution

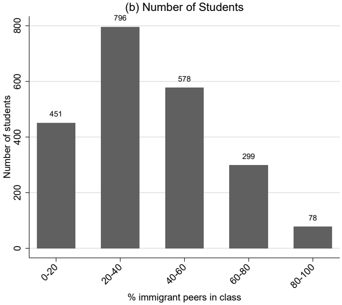
= Share and cultural distance of immigrant subgroups distinguishing between

   i. Religious affiliation (individual-level data):
   Muslims: mean= 0.18; std dev.= 0.18
   Non-muslims: mean= 0.20; std dev.= 0.11

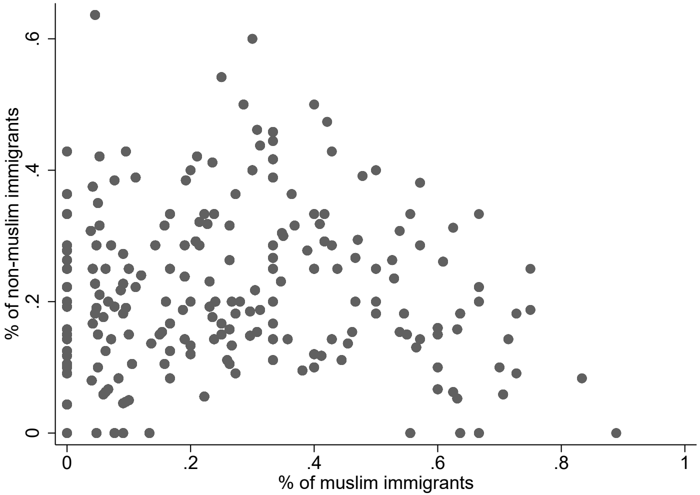
   ii. Linguistic distance (country-level data from the Ethnologue database):
   Distant: mean= 0.21; std dev.= 0.17
   Close: mean= 0.17; std dev.= 0.11



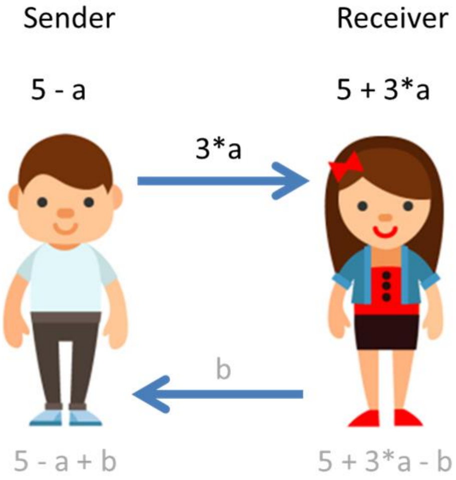
Sample size: 220 classes



Sample size: 2,202 native German students


% of non-muslim immigrants
0
.2
.4
.6
0
.2
.4
.6
.8
1
% of muslim immigrants

Investment Game (Berg et al, 1995)



Experimental Protocol

To elicit students' in-group bias, we conducted a **investment game** and asked students to fill out decision sheets being aware that ...

- they would earn money,
- decisions would be anonymous,
- they would first play as first-mover and then as second-mover,
- they would play with different game partners,
- partners were of their age and from the same state, but not the same school,
- partners would be randomly matched after all possible decisions were made,
- role of the sender or receiver randomly assigned,
- payoff based on their own decision and the decision of their partner,
- respective amount paid within two weeks in anonymized envelopes.

- **Important note**: By construction, statistical discrimination is constant with respect to class type

Decision Sheet (First Mover)

"You are the sender and you have 5 EURO. Which amount would you like to send to the receiver (max. 5 EURO each time)? Please check one box in each column 1-6."

The receiver is...					
COLUMN 1	**COLUMN 2**	**COLUMN 3**	**COLUMN 4**	**COLUMN 5**	**COLUMN 6**
... a boy with German parents	*... a girl with German parents*	*... a boy with foreign parents*	*... a girl with foreign parents*	*... a boy with foreign parents who possesses German citizenship*	*... a girl with foreign parents who possesses German citizenship*
☐ 0 EURO	☐ 0 EURO	☐ 0 EURO	☐ 0 EURO	☐ 0 EURO	☐ 0 EURO
☐ 0.5 EURO	☐ 0.5 EURO	☐ 0.5 EURO	☐ 0.5 EURO	☐ 0.5 EURO	☐ 0.5 EURO
☐ 1 EURO	☐ 1 EURO	☐ 1 EURO	☐ 1 EURO	☐ 1 EURO	☐ 1 EURO
☐ 1.5 EURO	☐ 1.5 EURO	☐ 1.5 EURO	☐ 1.5 EURO	☐ 1.5 EURO	☐ 1.5 EURO
☐ 2 EURO	☐ 2 EURO	☐ 2 EURO	☐ 2 EURO	☐ 2 EURO	☐ 2 EURO
☐ 2.5 EURO	☐ 2.5 EURO	☐ 2.5 EURO	☐ 2.5 EURO	☐ 2.5 EURO	☐ 2.5 EURO
☐ 3 EURO	☐ 3 EURO	☐ 3 EURO	☐ 3 EURO	☐ 3 EURO	☐ 3 EURO
☐ 3.5 EURO	☐ 3.5 EURO	☐ 3.5 EURO	☐ 3.5 EURO	☐ 3.5 EURO	☐ 3.5 EURO
☐ 4 EURO	☐ 4 EURO	☐ 4 EURO	☐ 4 EURO	☐ 4 EURO	☐ 4 EURO

Measuring In-Group Favoritism

We use the first four choices $\{S_1, ..., S_4\}$ to construct our main outcome variable, the **in-group out-group investment gap (IG)** of native students:

$$\mathrm{IG} = S_{\mathrm{N}} - S_{\mathrm{I}}$$

where

- $S_{\mathrm{N}} = \frac{1}{2}(S_1 + S_2)$ = avg. investment to natives
- $S_{\mathrm{I}} = \frac{1}{2}(S_3 + S_4)$ = avg. investment to immigrants

Out of the 2,257 native students 2,202 completed the experiment and exhibited an in-group out-group investment gap of 0.08 Euro on average (std. dev. 0.76)

We are interested in the impact of the **ethnic composition of native students' peer group on their investment gap ($\mathbf{IG}_i$)**:

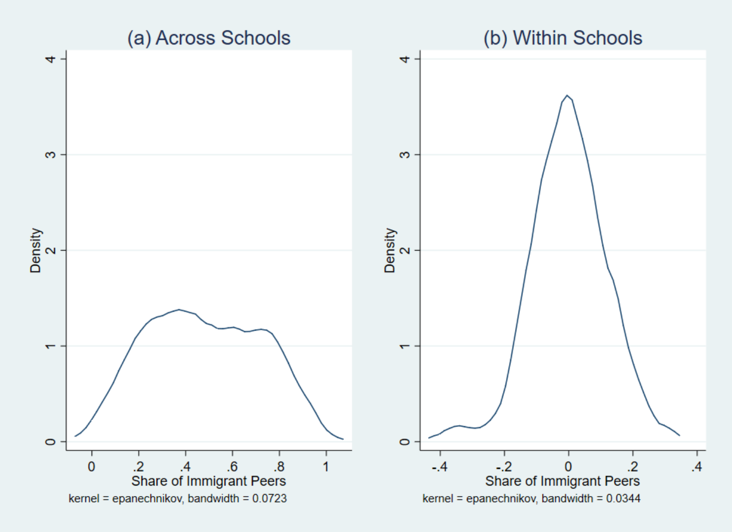
$$\mathbf{IG}_{i,c,s} = \alpha + \beta f(\textbf{Ethnic Diversity}_{\mathbf{c,s}}) + \gamma X_i + \delta Z_{c,s} + \theta_{\mathbf{s}} + \epsilon_{i,c,s}$$

We tackle endogenous peer group formation and control for common shocks by

- conducting a **within school analysis** (using school fixed effects θ_s),
- relying on the **quasi-random assignment of immigrants to classrooms.**

1. Sufficient within school variation in the ethnic composition of classes

Within School Variation



Distribution

Identifying Assumption

1. Sufficient within school variation in the ethnic composition of classes
2. Balancing on observables (within school)

Balancing on Observables

Back

Dependent Variable:	Percent Immigrants in Class	
	(1)	(2)
Male	-0.004	-0.004
	(0.010)	(0.005)
Age	0.055***	-0.006
	(0.012)	(0.005)
Age missing	-0.035	-0.031
	(0.033)	(0.019)
Protestant	-0.086***	0.006
	(0.018)	(0.008)
Muslim	0.098**	0.000
	(0.039)	(0.019)
Other religion	-0.103***	-0.002
	(0.020)	(0.009)
SES: Two-parent hh; low education	0.035***	-0.006
	(0.013)	(0.007)
SES: Single-parent hh; high education	0.017	-0.001
	(0.017)	(0.009)
SES: Single-parent hh; low education	0.053***	-0.003
	(0.014)	(0.006)
SES: missing	0.075***	0.002
	(0.015)	(0.007)
Age mother	-0.002*	0.001
	(0.001)	(0.001)
Age mother: missing	0.069	-0.012
	(0.042)	(0.022)
Age father	-0.001	-0.000
	(0.001)	(0.000)
Age father: missing	0.058	0.023
	(0.042)	(0.019)
Class size	-0.004	0.000
	(0.003)	(0.003)
Observations	2,202	2,202
R-squared	0.114	0.736
F-statistic	7.06	1.21
p-value	0.000	0.263
School FE		✓

Identifying Assumption

1. Sufficient within school variation in the ethnic composition of classes
2. Balancing on observables (within school)
   $\rightarrow$ 0/15 observables significantly predict the share of immigrant peers
   $\rightarrow$ Observables do not jointly predict the share of immigrant peers
   $\rightarrow$ Similar balancing for muslim share
3. Random assignment of immigrants to classrooms (within school)
   $\rightarrow$ Class fixed effects do not significantly predict immigrant background conditional on school fixed effects (p=0.266)
   $\rightarrow$ Similar result for muslim background (p=0.471)

Identifying Assumption

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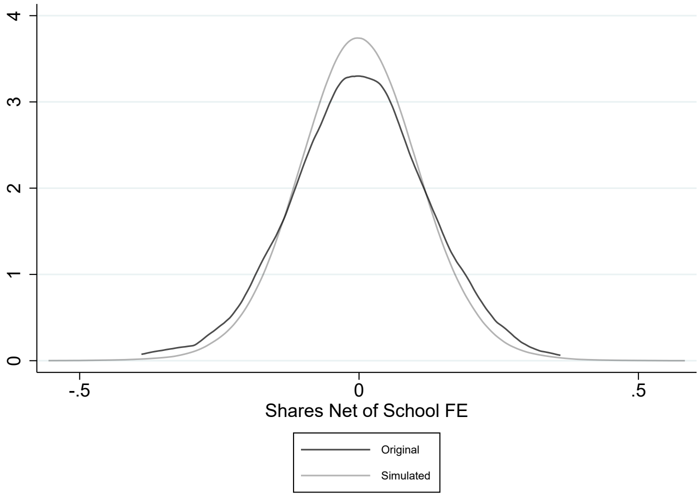
   $\rightarrow$ Similar result for muslim background (p=0.471)
4. Simulation of random assignment of immigrants to classrooms (within school)
   $\rightarrow$ Actual distribution qualitatively similar to the simulated one


4
3
2
1
0
-.5
0
.5
Shares Net of School FE
Original
Simulated

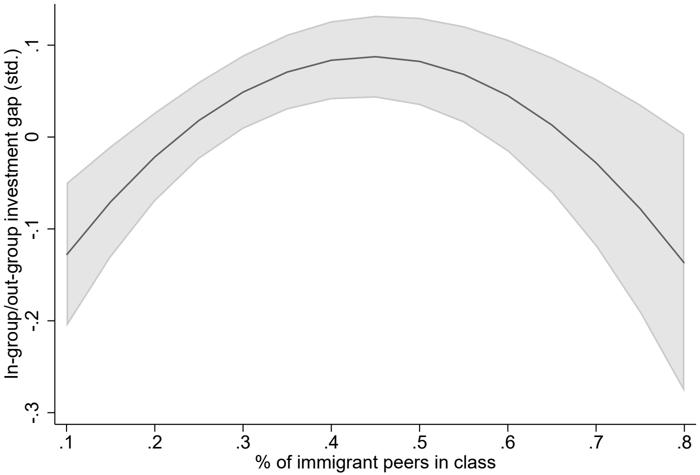
Impact of the **share of immigrants peers** in the classroom:

$$\mathsf{IG}_{i,c,s} = \alpha + \beta f(\textbf{Diversity}_{\boldsymbol{c,s}}) + \gamma X_i + \delta Z_{c,s} + \theta_s + \epsilon_{i,c,s}$$

where we use a 2^{nd} **order polynomial of the immigrant share $\boldsymbol{\pi}_I$** to model the function of ethnic diversity:

$$\boldsymbol{\beta f}(\text{Diversity}_{\boldsymbol{c,s}}) = \boldsymbol{\beta_1 \pi_I} + \boldsymbol{\beta_2 \pi_I^2}$$

In-Group Favoritism: An Inverted-U



Note: 1 standard deviation = 76 Euro-cents

▸ Tables

Building upon the measures of Polarization and Fractionalization ...

$$\text{Polarization} = 4\sum_{i=1}^{N} \pi_{Ii}^2(1-\pi_{Ii}) \quad \text{and} \quad \text{Fractionalization} = 2\sum_{i=1}^{N} \pi_{Ii}(1-\pi_{Ii})$$

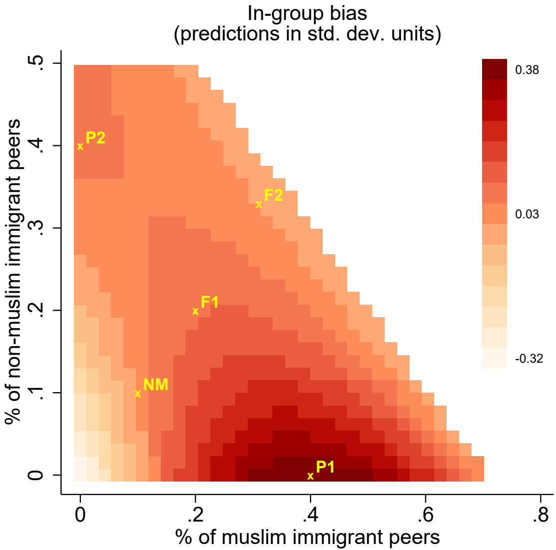
... and starting with three subgroups – two immigrant subgroups (π_{I1},π_{I2}) and natives ($1-\pi_{I1}-\pi_{I2}$) – ethnic diversity can be expressed as:

$$\mathcal{F}(\pi_{I1},\pi_{I2}) = \underbrace{\overbrace{4(\pi_{I1}+\pi_{I2}-\pi_{I1}^2-\pi_{I2}^2-\pi_{I1}\pi_{I2})}^{=FRAC} - 12(\pi_{I1}\pi_{I2}-\pi_{I1}^2\pi_{I2}-\pi_{I1}\pi_{I2}^2)}_{=POLAR}$$

Empirically, a model that nests both polarization and fractionalization is:

$$\begin{aligned} IG_{i,c,s} =& \alpha + \beta_1\pi_{I1,c,s} + \beta_2\pi_{I2,c,s} + \beta_3\pi_{I1,c,s}^2 + \beta_4\pi_{I2,c,s}^2 + \beta_5\pi_{I1,c,s}\times\pi_{I2,c,s} + \\ & \beta_6\pi_{I1,c,s}^2\times\pi_{I2,c,s} + \beta_7\pi_{I2,c,s}^2\times\pi_{I1,c,s} + \gamma X_i + \delta Z_{i,c,s} + \sigma_s + \epsilon_{i,c,s} \end{aligned}$$

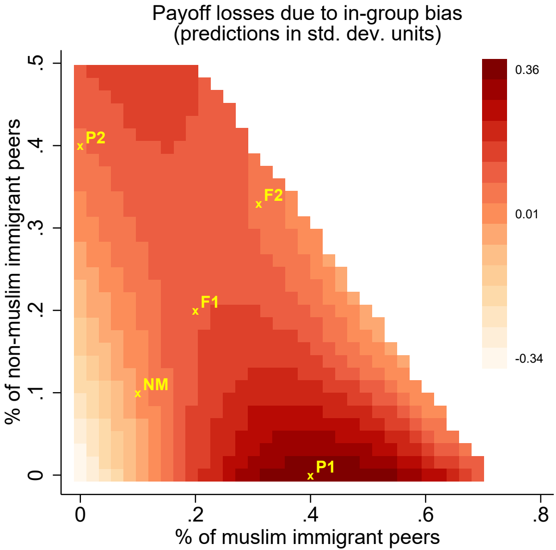
In-Group Favoritism: How Type of Diversity Matters



Differences: culturally polarized classroom vs. four other classroom types	
P1-NM	0.392***
	(0.149)
P1-F1	0.308*
	(0.161)
P1-F2	0.415**
	(0.183)
P1-P2	0.337**
	(0.168)

(1 std.dev. = 76 Euro cents)

Payoff Losses Due to In-Group Favoritism



Differences: culturally polarized classroom vs. four other classroom types	
P1-NM	0.388**
	(0.161)
P1-F1	0.254
	(0.171)
P1-F2	0.323
	(0.197)
P1-P2	0.308*
	(0.177)

(1 std.dev. = 36 Euro cents)

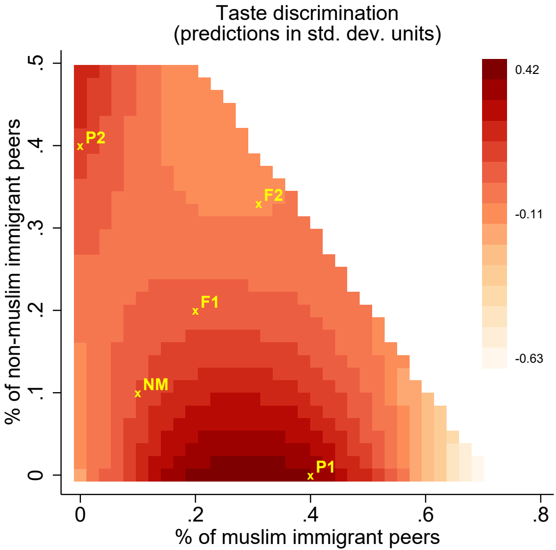
Mechanism I: Taste Discrimination

To examine taste discrimination, we look at the choices of natives when playing as "receivers"

These choices capture other-regarding preferences towards natives vs. immigrants

- Receivers choose how much to transfer back to senders, as a function of how much they received from them
- Since we implemented a strategy vector method, receivers act as dictators, with no strategic considerations (e.g., no reciprocity)

Mechanism I: Taste Discrimination



Differences: culturally polarized classroom vs. four other classroom types	
P1-NM	0.287
	(0.206)
P1-F1	0.325
	(0.224)
P1-F2	0.445*
	(0.260)
P1-P2	0.236
	(0.223)

(1 std.dev. = 1.05 Euro cents)

Mechanism II: Statistical Discrimination

Recall that individuals know they are playing against a randomly selected individual from another school, and not someone from their own classroom

By construction, statistical discrimination is constant with respect to class type

$\Rightarrow$ As such, **we can rule out statistical discrimination** as a mechanism

Mechanism III: Stereotypes

An important rationale for sending money is "trust", i.e., the sender's beliefs that the receiver will reciprocate generously

Natives may lack trust in immigrants if they are treated worse by immigrants in their classroom relative to how they are treated by natives

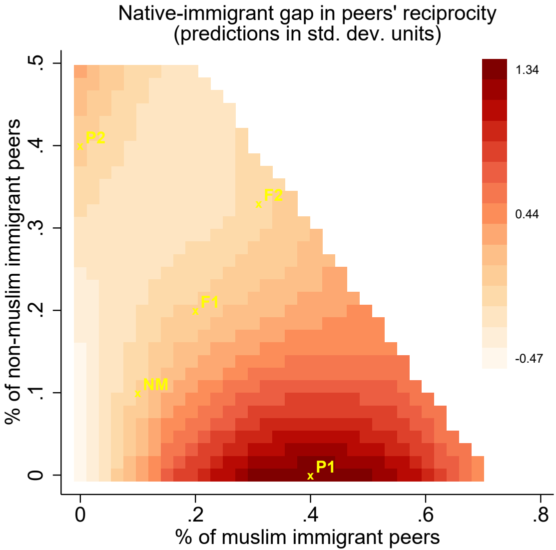
If natives (mistakenly) extrapolate their experience within their classroom, they would trust **all** immigrants less than natives, and rationally invest less in immigrants vs. natives given these biased beliefs

Mechanism III: Stereotypes – Role of Peers' Behavior

To examine the scope for stereotypes as a mechanism, we first look at the predicted gap in how much natives transfer back to natives vs. how much immigrants transfer back to natives

- a reasonable proxy for differential treatment by immigrants versus natives
- feasible due to the strategy vector method

Mechanism III: Stereotypes – Role of Peers' Behavior



Differences: culturally polarized classroom vs. four other classroom types	
P1-NM	1.386***
	(0.517)
P1-F1	1.370***
	(0.495)
P1-F2	1.435**
	(0.610)
P1-P2	1.350***
	(0.510)

(1 std.dev. = 1.3 Euro cents)

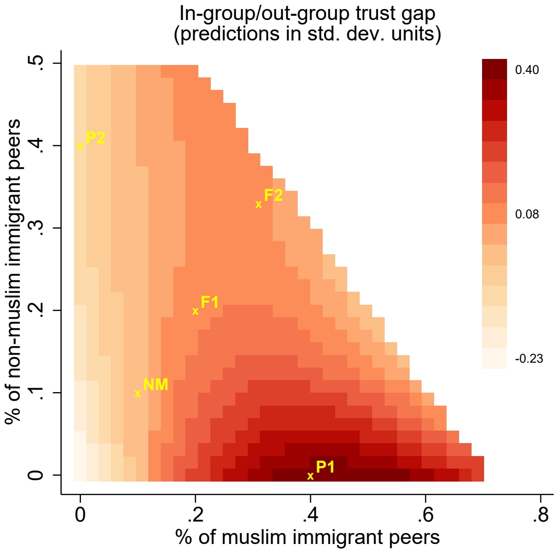
Mechanism III: Stereotypes – Trust

We just showed evidence suggesting that natives are treated worse by immigrants than natives in polarized classrooms

If they extrapolate this experience to the broader population of immigrants, we would expect them to express less trust in immigrants relative to natives

To test this, we use survey questions, recorded on a scale from 1 to 10, asking how much do you trust a native German and how much do you trust an immigrant

Mechanisms I: Stereotypes – Trust



Differences: culturally polarized classroom vs. four other classroom types	
P1-NM	0.402**
	(0.179)
P1-F1	0.322*
	(0.194)
P1-F2	0.349
	(0.222)
P1-P2	0.496**
	(0.196)

Conclusions

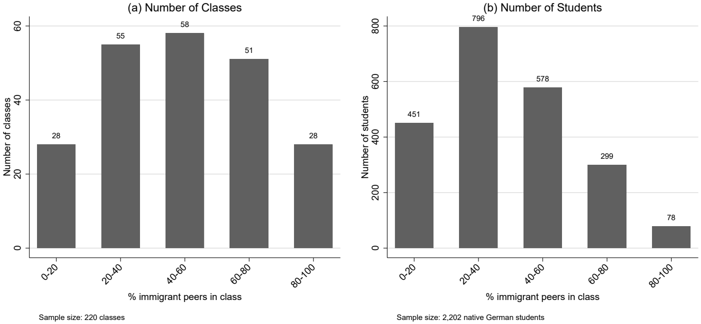
Contrary to what one naively may expect, social cohesion does not necessarily increase when bringing people from different background together

- Natives' in-group bias has an inverse U-shape in the share of out-group members (immigrants),
- Digging deeper, in-group bias peaks in polarized classrooms where only natives and culturally distant immigrants are present and are roughly equally represented
- At the peak, in-group bias comes with substantial payoff losses
- Mechanisms:
  - No statistical discrimination due to our design
  - Minor role of taste discrimination
  - Stereotypes – due to differential classroom experiences – as the main driver

Thank you!

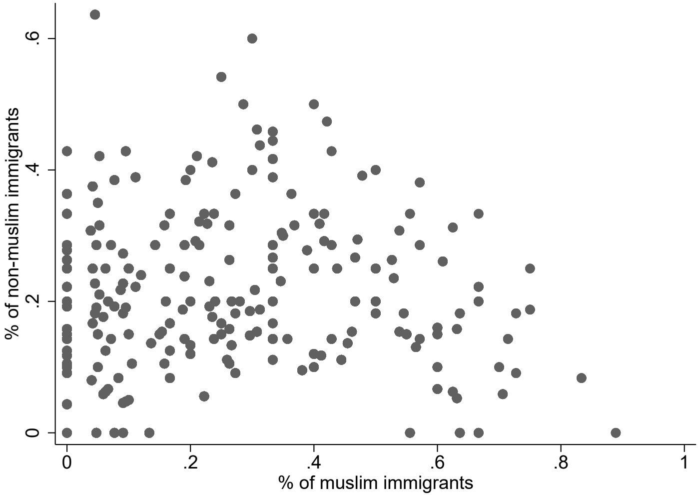
Appendix

Share of Immigrant Peers



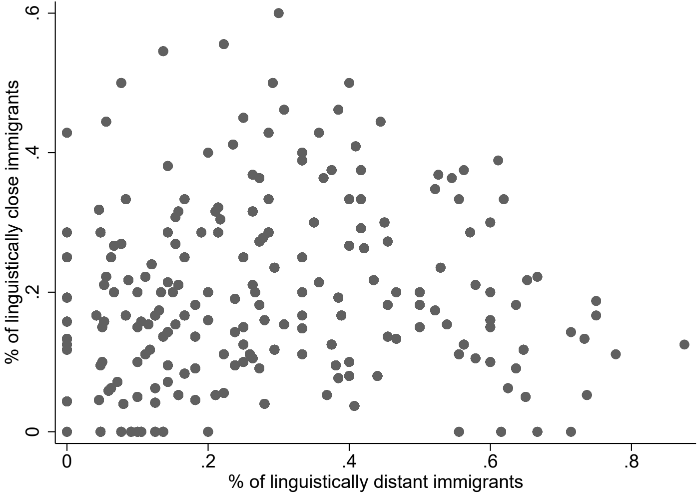
Back Identification

Share of Muslim and Non-Muslim Immigrant Peers



Back

Share of Linguistically Distant and Close Immigrant Peers



Back

In-group Favoritism: Share of immigrant peers

Dependent Variable:	In-group/out-group investment gap (std.)		
	(1)	(2)	(3)
% of immigrant peers	1.568***	1.602***	1.605***
	(0.398)	(0.399)	(0.398)
% of immigrant peers squared	-1.757***	-1.809***	-1.797***
	(0.468)	(0.470)	(0.467)
p-value: Both coeff. are jointly equal to zero	0.0005	0.0004	0.0004
p-value: Sum of both coeff. is equal to zero	0.280	0.241	0.267
Observations	2,202	2,202	2,202
R-squared	0.054	0.063	0.068
Basic controls	✓	✓	✓
Religious background		✓	✓
Family background			✓

▸ Back ▸ Linear specifications ▸ More flexible specifications

Additional Specification - First Order Polynomial

Dependent Variable:	In-Group/Out-Group Investment Gap		
	(1)	(2)	(3)
% of immigrant peers	0.080	0.052	0.034
	(0.294)	(0.295)	(0.298)
Observations	2,145	2,145	2,145
R-squared	0.047	0.053	0.061
Basic controls	✓	✓	✓
Religious background		✓	✓
Family background			✓

Back

Additional Specification - Third Order Polynomial

Dependent Variable:	In-group/out-group investment gap (std.)		
	(1)	(2)	(3)
% of immigrant peers	2.187***	2.124**	2.045**
	(0.805)	(0.820)	(0.809)
% of immigrant peers squared	-3.482*	-3.264	-3.024
	(2.076)	(2.113)	(2.092)
% of immigrant peers cubed	1.292	1.089	0.919
	(1.571)	(1.589)	(1.578)
Observations	2,202	2,202	2,202
R-squared	0.054	0.063	0.068
Basic controls	✓	✓	✓
Religious background		✓	✓
Family background			✓

Back

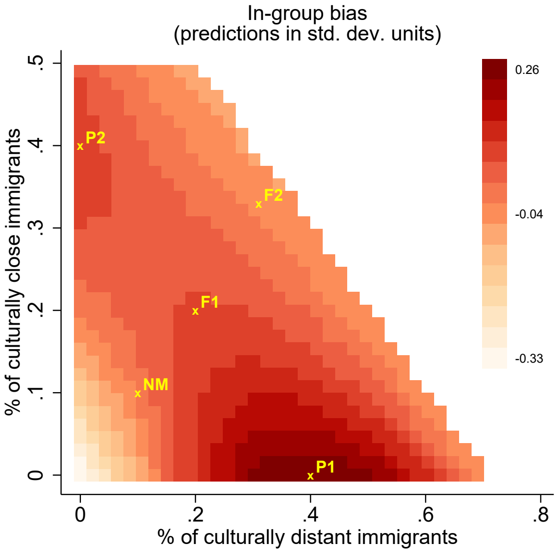
In-Group Favoritism: An Inverted-U (Cubic)

Note: 1 standard deviation = 76 Euro-cents

Back

Dependent Variable:	In-Group/Out-Group Investment Gap		
	(1)	(2)	(3)
% of muslim immigrant peers (π_m)	3.012***	3.007***	2.902***
	(0.804)	(0.798)	(0.809)
% of non-muslim immigrant peers (π_n)	1.490***	1.486***	1.438***
	(0.527)	(0.531)	(0.533)
π_m^2	-3.818***	-3.790***	-3.596***
	(1.012)	(1.008)	(1.024)
π_n^2	-1.544	-1.587	-1.534
	(0.974)	(0.983)	(0.984)
$\pi_m \times \pi_n$	-12.069**	-11.923**	-11.215**
	(5.023)	(5.023)	(5.122)
$\pi_m^2 \times \pi_n$	9.493*	9.004*	8.037
	(4.994)	(5.031)	(5.101)
$\pi_m \times \pi_n^2$	9.412	9.594	9.172
	(6.481)	(6.476)	(6.566)
Observations	2,163	2,163	2,163
R-squared	0.058	0.059	0.064
Basic controls	✓	✓	✓
Religious background		✓	✓
Family background			✓

Robustness: Linguistically Close and Distant Immigrants



	Differences: culturally polarized classroom vs. four other classroom types
P1-NM	0.282***
	(0.107)
P1-F1	0.206*
	(0.116)
P1-F2	0.321**
	(0.142)
P1-P2	0.187
	(0.143)

Back

Model which Can Rationalize Our Findings

We write down a model of social group formation for two types of individuals with different innate cultural identities. We combine the ideas of

- Brock and Durlauf's (2001) "discrete choice with social interactions model" for social conformity preferences,
- Hotelling's (1929) "linear city" model with cultural identity distances.

Consistent Model

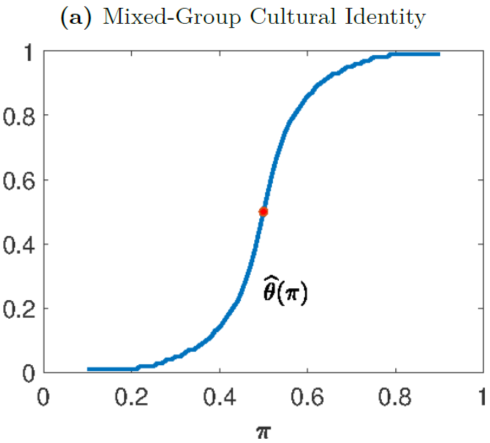
Setting:

- Individuals of type $A \equiv (\mathrm{N}; \mathrm{I})$,
- Share of type I equals $\Pi \in (0, 1)$ and of type N equals $(1 - \Pi)$,
- Cultural identity θ of type N equals 0 and of type I equals 1 .

- Individuals choose
  - with probability μ_a to join the mixed group and adopt cultural identity $\theta \in (0, 1)$,
  - with probability $(1 - \mu_a)$ to stay with their own type group and retain their own culture.

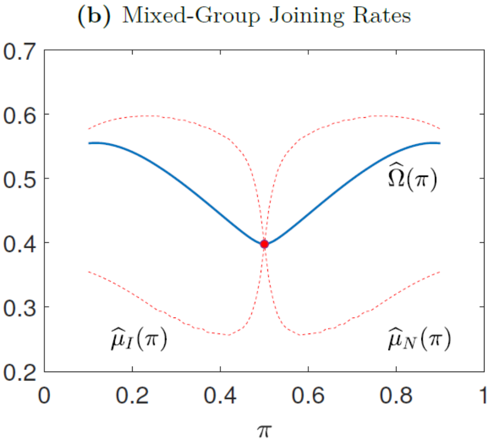
- Individuals have preferences *for group size*, but *against cultural distance*

Details



Symmetric benchmark case:

- Homogenous preferences for group size and against cultural distance
- If share of immigrants $\Pi = 0.5$, then cultural identity of the mixed group $\theta = 0.5$



Key to the model are two opposing forces

- *direct effect* of group size holding cultural identity of the mixed group constant
- *indirect effect* of a changing cultural identity as the share of immigrants changes

Model Details

Utility of Natives if in

- mixed group: $u_i^\theta = \beta_N[(1-\Pi)\mu_N + \Pi\mu_I] - h_N(\theta) + \epsilon_i^\theta$
- own type group: $u_i^0 = \beta_N[(1-\Pi)(1-\mu_N)] + \epsilon_i^0$

Utility of Immigrants if in

- mixed group: $u_i^\theta = \beta_I[(1-\Pi)\mu_N + \Pi\mu_I] - h_1(1-\theta) + \epsilon_i^\theta$
- own type group: $u_i^1 = \beta_I[\Pi(1-\mu_I)] + \epsilon_i^1$

where

β is the utility gain from group size,

$h()$ is the utility loss from cultural distance,

ϵ_i^θ is an i.i.d. extreme value distributed utility shocks.

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Model Assumptions

Assumption 1:
The social preference parameters satisfy $\beta_a \in (0, 2)$ for $a \in (N, I)$. The cost of cultural distance $h_a()$ is twice continuously differentiable and satisfies $h_a(0) = 0$, $h'_a(\theta) > 0$, $h''_0(\theta) > 0$ with $h''_0(\theta) > (h'_a(\theta))^2 > 0$ for any $\theta \in [0, 1]$ and for $a \in A$.

Assumption 2:
Cultural identity $\theta \in [0, 1]$ of the mixed group maximizes the size of that group given Π

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