Allocating Primary Care Physicians Without Prices

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Motivation

- Most healthcare markets in the world rely heavily on non-price mechanisms to allocate scarce resources
  - ↳ Gate-keeping, queues, centralized assignment
- Not (necessarily) because it wouldn't work well to use prices, but because many societies have elected not to
- Regulators' key challenge is to design allocation mechanisms that are both efficient and fair

⇒ **Today's focus:** Allocating individuals to General Practitioners (GPs)

Background

- Many countries use a "patient panel" system to organize primary care
  - ↳ (Norway, Denmark, Netherlands, UK, France, Italy, Canada, et al.)
    - Basic idea: Can capitate payments based on panel size,
      incentivizing GPs to attract patients,
      while avoiding full fee-for-service,
      and also encouraging continuity of care

Background

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    - Basic idea: Can capitate payments based on panel size,
      incentivizing GPs to attract patients,
      while avoiding full fee-for-service,
      and also encouraging continuity of care
- While in theory patients have free choice of GP, in practice there are capacity constraints
- Some countries use formal panel caps to avoid over-crowding
  - ↳ (Norway, Denmark, Italy, [et al.?])

⇒ **Research question:** How best to do this?

Research questions

$\Rightarrow$ How to best design a GP allocation system that uses formal panel caps, given a set of GPs and GP capacities?

Research questions

⇒ How to best design a GP allocation system that uses formal panel caps, given a set of GPs and GP capacities?

- **Status quo in Norway:** – Can always switch to "open" GPs
  – Can stand on one waiting list for a "full" GP
  - → But there are visible unrealized gains from trade
- What are the gains from a more "complicated" system?
  – Top-Trading Cycles
  – Allow waiting on multiple waitlists, asking for rank-order lists
  – Providing information about waiting times

- Empirically, what are the gains (and/or costs) from these changes?
- What are the implications for fairness?

Related literature and contribution

Health Care

- **Primary care is important**: Fadlan & Van Parys (2020); Bailey & Goodman-Bacon (2015); Baker, Bundorf, & Royalty (2019); Chen et al. (2021)
- **Rationing through wait-times:** Gruber et al. (2020); Propper (1991, 1995); Johar et al. (2011, 2013); Shen et al. (2020); Mark (2021)

Market Design

- **Static re-matching:** Abdulkadiroglu & Sonmez (1999), Sonmez & Unver (2005), Roth et al. (2004), Leshno & Lo (2020)
- **Dynamic assignment:** Bloch & Cantala (2017), Arnosti & Shi (2020), Leshno (2021), Agarwal et al. (2021), Verdier & Reeling (2021), Waldinger (2021)
- **Dynamic re-matching:** Narita (2018); Feigenbaum et al (2020); Combe et al 2021
- **Empirical market design evaluation:** Niederle & Roth (2003); Abdulkadiroglu et al. (2017); Prendergast (2017, 2021)

$\Rightarrow$ **This paper:** New application at intersection

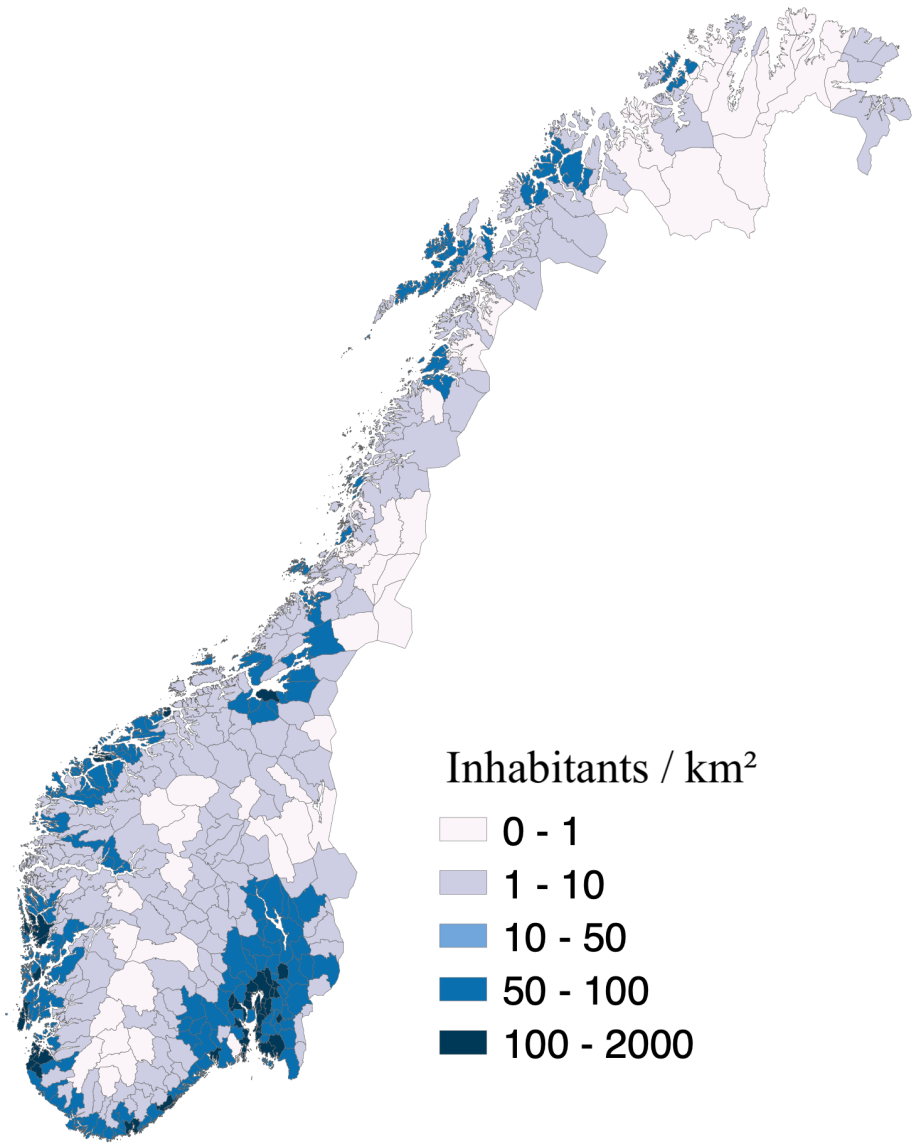
1. Setting

2. Simulations (holding behavior fixed)

3. Empirical strategy (to predict counterfactual behavior)
   - Reduced form evidence

4. Conclusion

Norway



Setting

Norwegian primary care system : *fastlegeordningen*

> "The purpose of the GP scheme is to ensure that everyone receives necessary primary care services of good quality in good time, and that all residents of Norway have a regular GP with whom to have a relationship."

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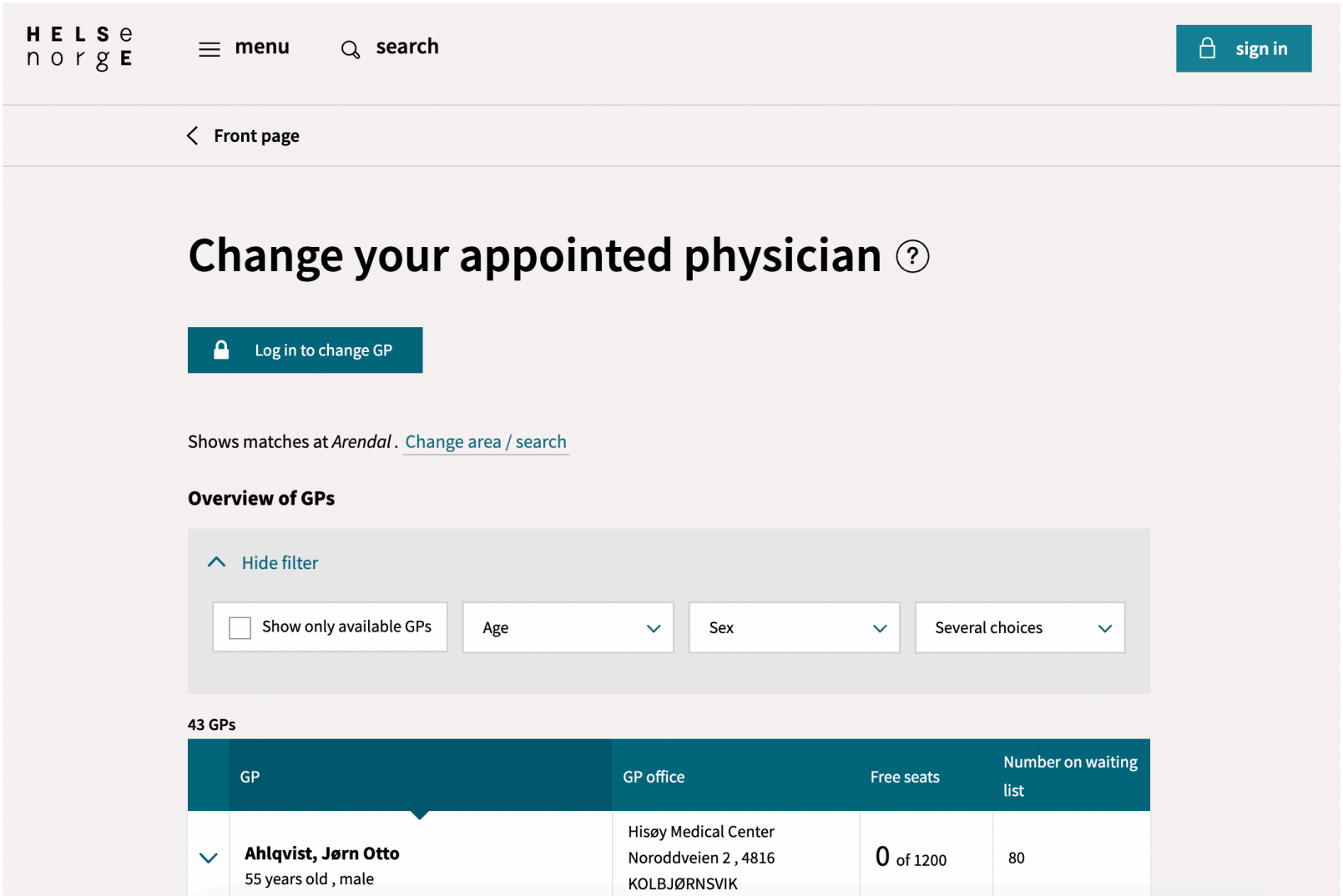
> "The purpose of the GP scheme is to ensure that everyone receives necessary primary care services of good quality in good time, and that all residents of Norway have a regular GP with whom to have a relationship."

- All individuals assigned to a GP
  - Can switch GPs up to 2 times per year
  - Children endowed with mother's GP at birth
- GPs are licensed sole-proprietors, with all revenue from govt + copays
  - Each GP has a formal "panel cap" on number of patients (avg. 1,150)
- Patients access web interface to view available GPs and switch GPs
  - Starting in Nov 2016, can add oneself to a waitlist for a full GP
  - Can stand on at most one waitlist at a time
  - Assigned from waitlist on a first-come, first-served basis

Interface to switch GP on HelseNorge.no

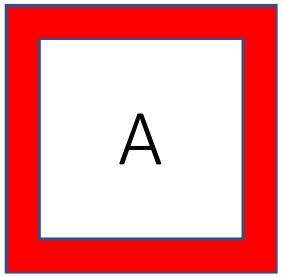


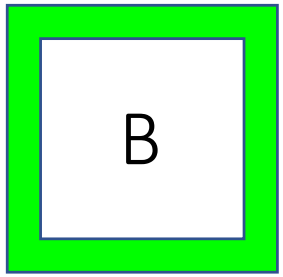
Interface to switch GP on HelseNorge.no

43 GPs

GP	GP office	Free seats	Number on waiting list
Ahlqvist, Jørn Otto 55 years old , male	Hisøy Medical Center Noroddveien 2 , 4816 KOLBJØRNSVIK	0 of 1200	80
Andersen, Torkil Padkær 63 years old , male	The sea tin doctors Kystveien 154 , 4842 Arendal	0 of 1250	29
Andersen, Magnus Kåre Skjeggedal 36 years , male	Kystveien Medical Center Kystveien 244 , 4841 ARENDAL	0 of 1350	73
Archer, Magnus Bakke 45 years , male	Legegruppen Arendal Havnegaten 1 , 4836 ARENDAL	0 of 1200	27
Austad, Kristian Efjestad 45 years , male	Stoa Medical Center Stoaveien 45A , 4848 ARENDAL	0 of 850	59
Berge, Siri Dalsmo 44 years old , female Has a substitute in 35% until and including 31 December 2022	Bjønneslegene DA Frolandsveien 6 , 4847 ARENDAL	0 out of 600	117
Blikman, Maria Johanna Christina 42 years old , female	Moland Medical Center Kystveien 690 , 4815 SALTRØD	0 of 660	150

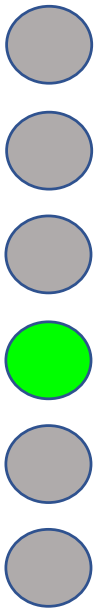
Scope for improved design



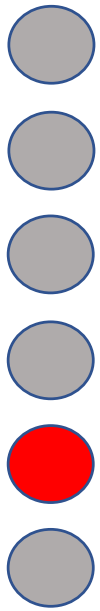


Waitlist for A

Waitlist for B

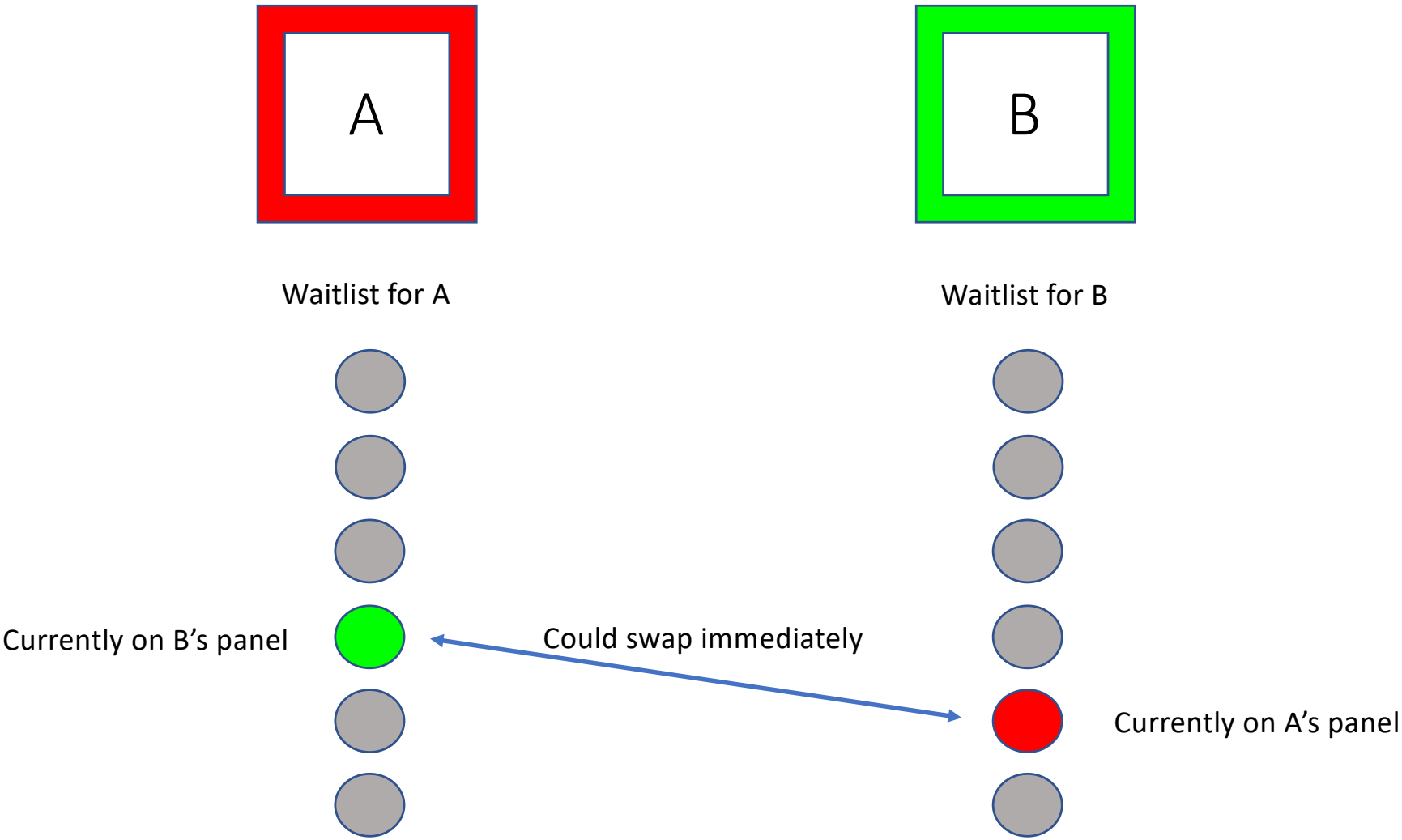


Currently on B's panel



Currently on A's panel

Scope for improved design



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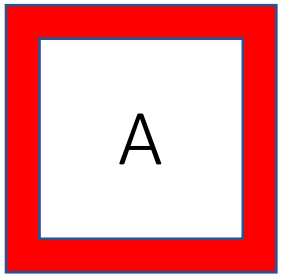

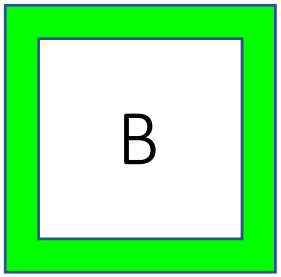

Waitlist for A

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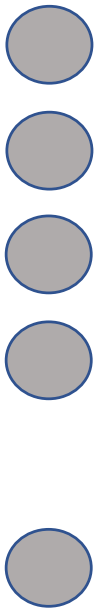

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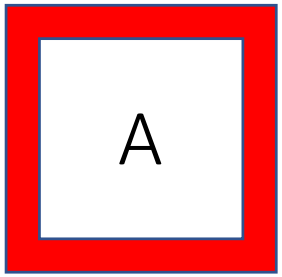

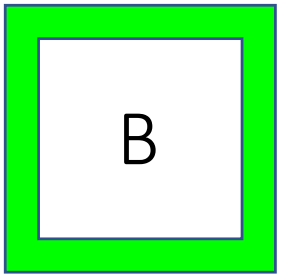

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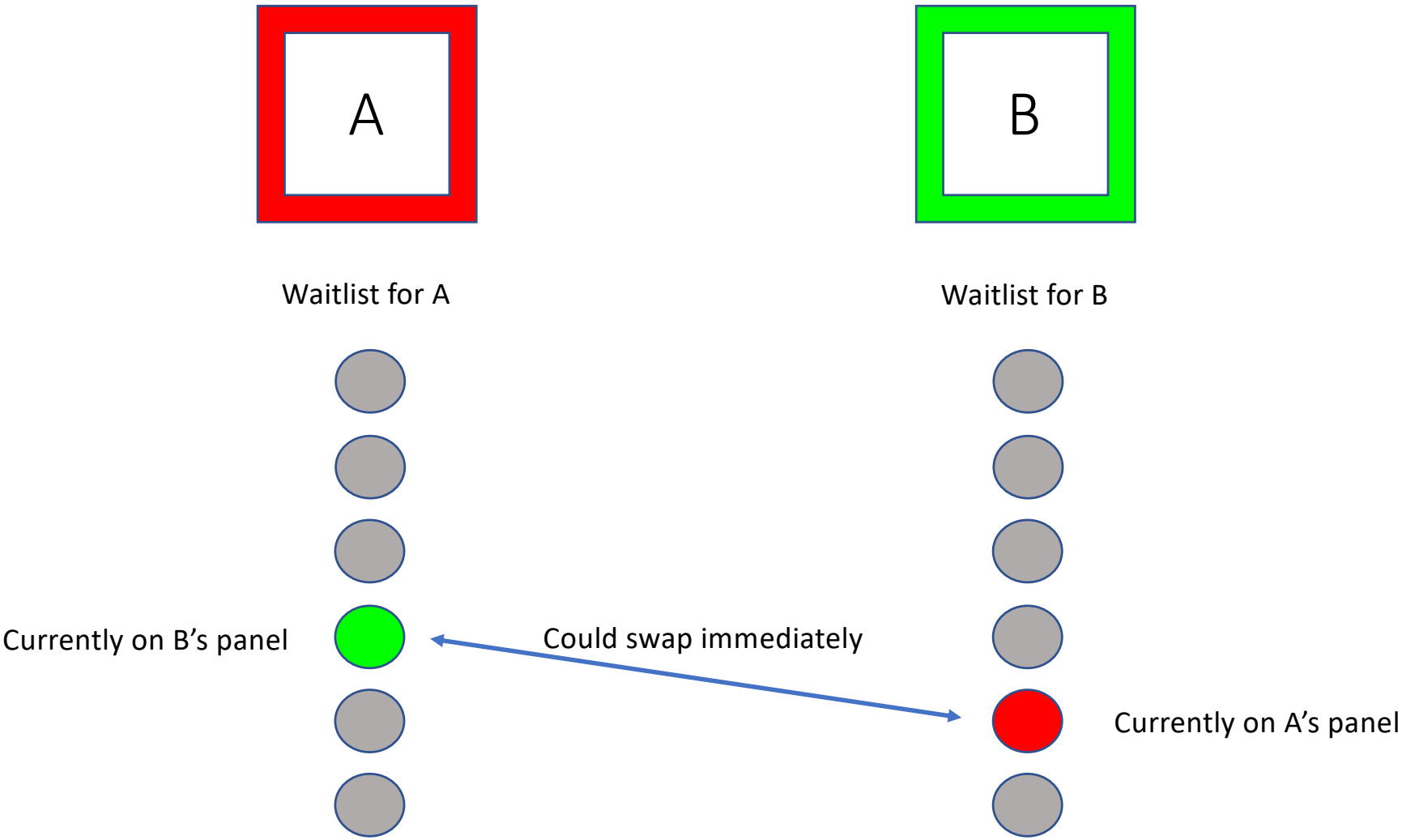

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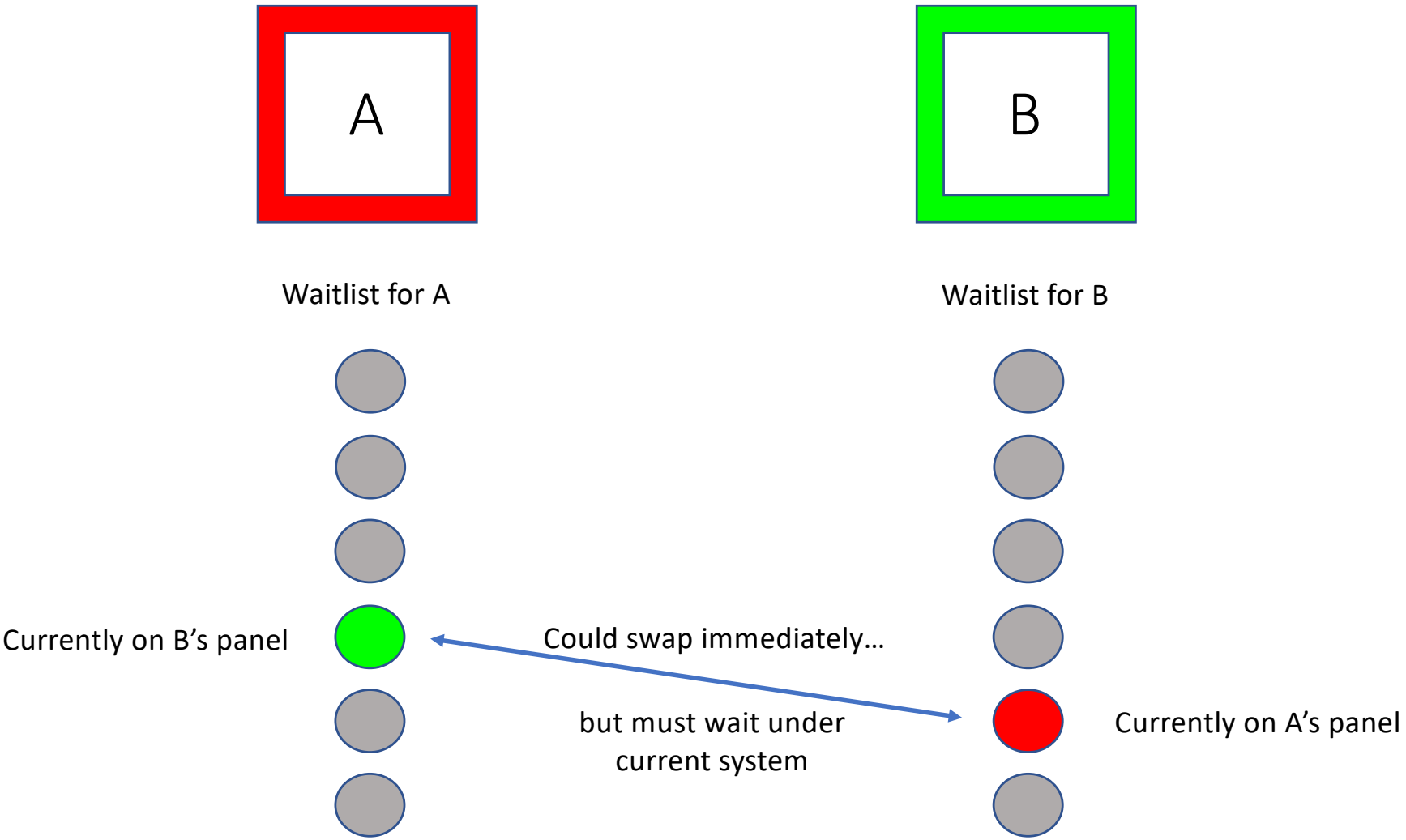

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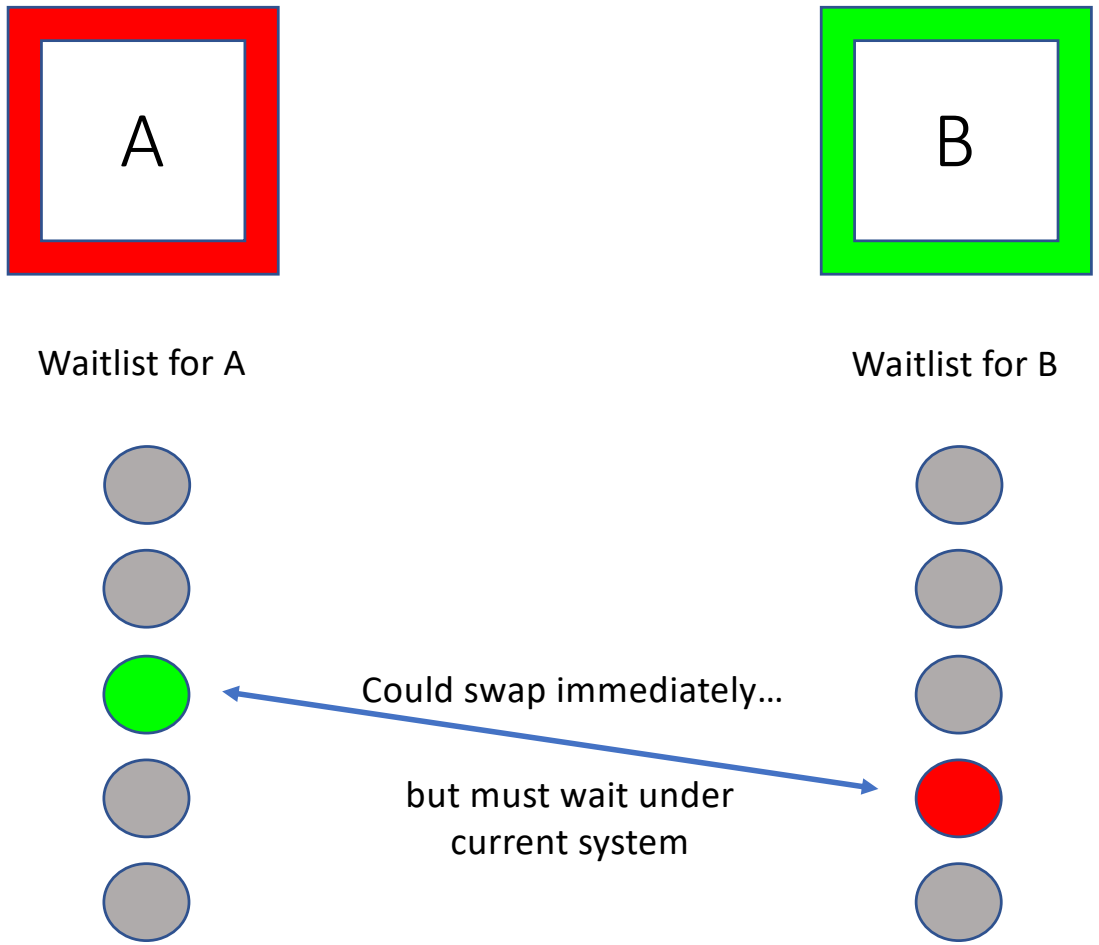

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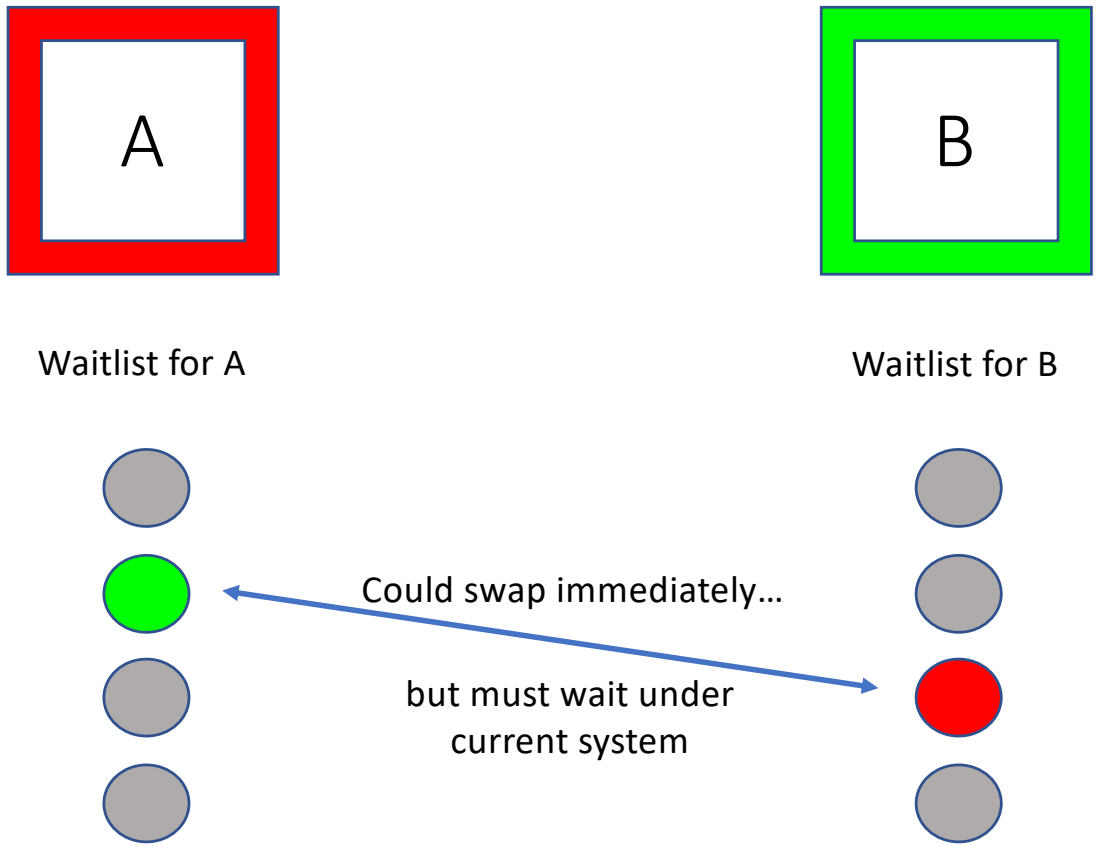

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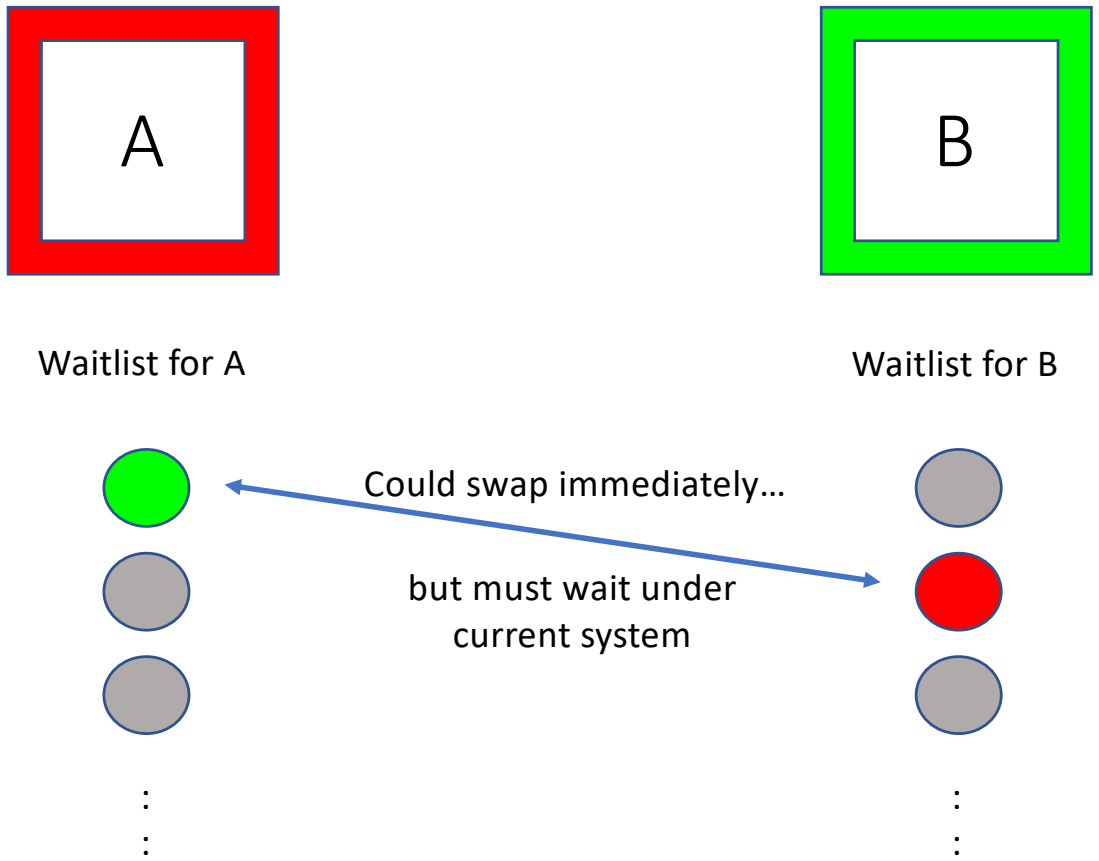
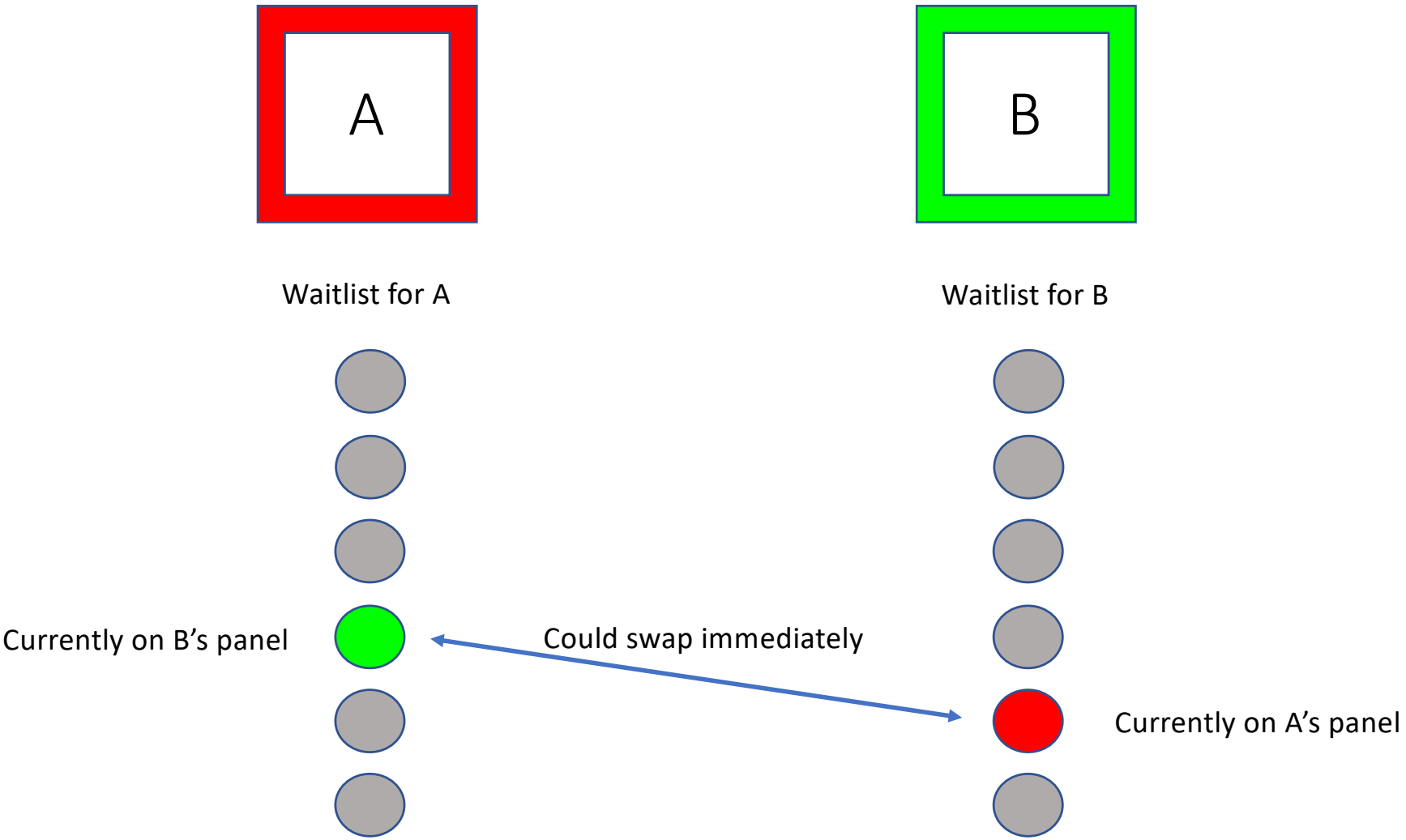


→ In Dec. 2019, **19%** of persons waiting could have been assigned with TTC

But at what cost to "fairness"?



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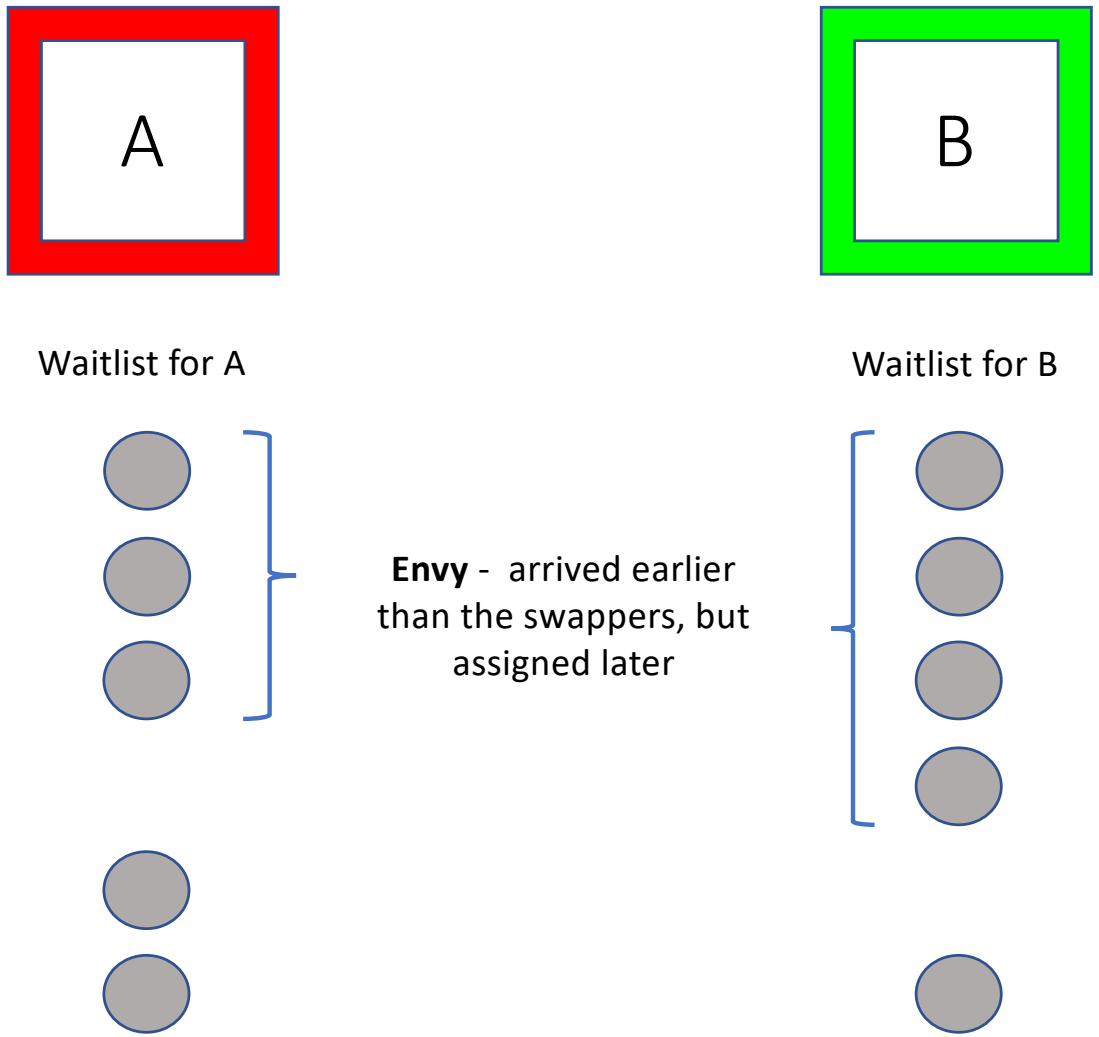


Data

- GP system (*fastlegeordningen*) data, 2001–2019
  - Monthly GP assignment, waitlist spells
- Patient demographics
  - Monthly municipality of residence
  - Age, gender, family structure, income, education..
- GP characteristics
  - Office coordinates
  - Age, gender, family structure, income, education..
- Healthcare utilization, 2008–2017
  - All encounters with public healthcare system

Summary stats: Individuals

	Mean	SD
Number of individuals	4,854,254	
Demographics		
Pct. female	0.50	
Pct. born in Norway	0.77	
Age	47	20
Pct. ever moved	0.12	
Choice of GP		
Pct. with GP of same gender	0.58	
Travel time to GP (min.)	11	20
Use of waitlists		
Pct. ever on a waitlist	0.08	
Pct. waiting for GP of same gender	0.65	
Number of months on a waitlist $\mid > 0$	6	6
Travel time to waitlist GP – current GP (min.)	-7	49

Notes: Over-16 only. Based on 48 months 2016–2019.

Summary stats: GPs

	All GPs	Undersubscribed	Oversubscribed
Number of GP panels	6,867		
Pct. of GP panels	1.00		
Panel characteristics			
Enrollment cap	1,145		
Pct. months with available slots	0.37		
GP demographics			
Pct. born in Norway	0.72		
Pct. female	0.42		
Pct. rural	0.37		
Age	49		
Panel enrollment stats.			
Num. enrollees	1,077		
Num. waiting on waitlist	12		
Num. enrollees / cap	0.94		

Notes: Based on 48 months 2016–2019. Oversubscribed = full for 75% of months.

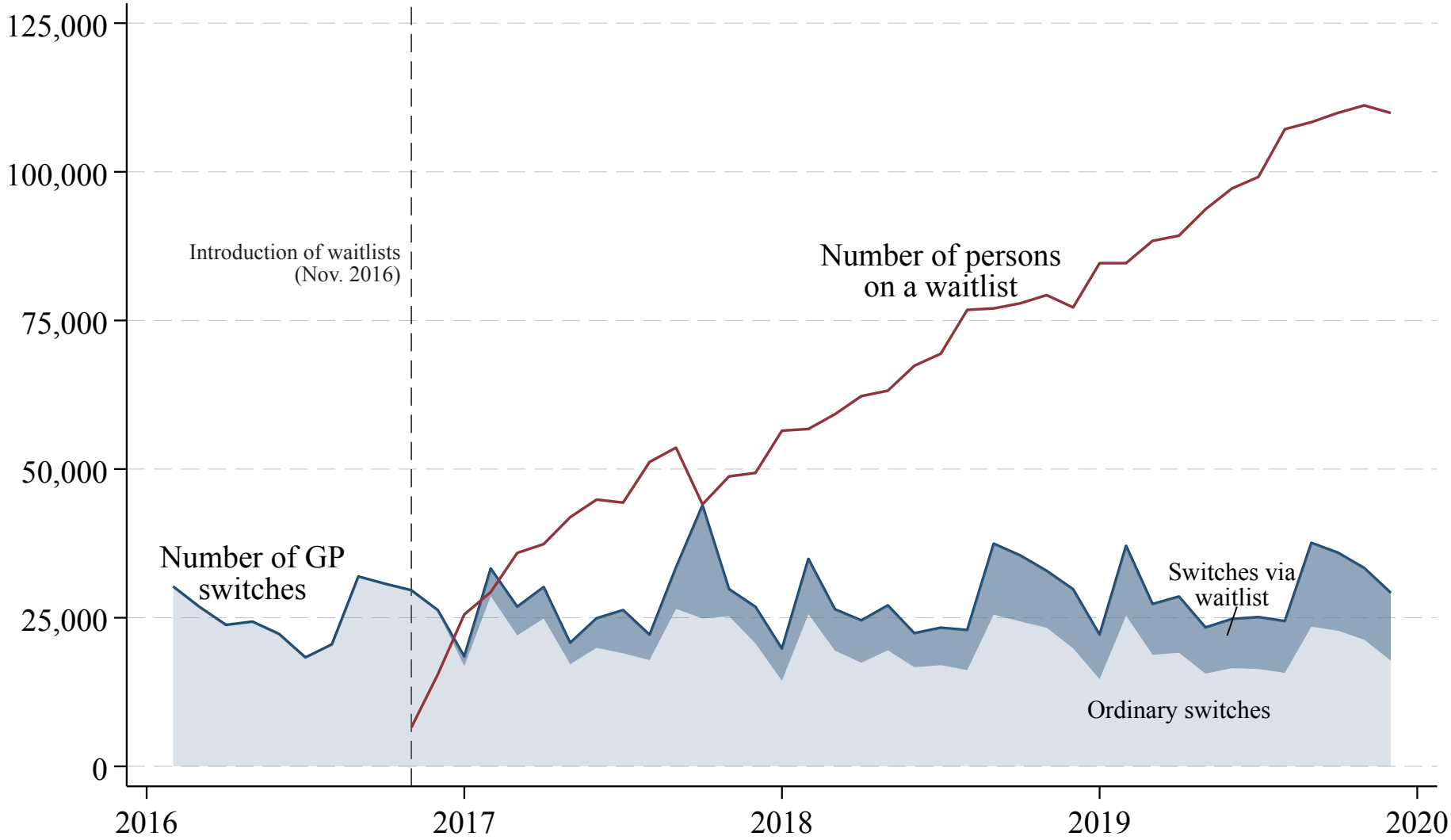
Summary stats: GPs

	All GPs	Undersubscribed	Oversubscribed
Number of GP panels	6,867	3,942	2,925
Pct. of GP panels	1.00	0.57	0.43
Panel characteristics			
Enrollment cap	1,145	1,154	1,137
Pct. months with available slots	0.37	0.69	0.07
GP demographics			
Pct. born in Norway	0.72	0.59	0.83
Pct. female	0.42	0.33	0.51
Pct. rural	0.37	0.44	0.30
Age	49	49	49
Panel enrollment stats.			
Num. enrollees	1,077	1,010	1,140
Num. waiting on waitlist	12	2	20
Num. enrollees / cap	0.94	0.88	1.00

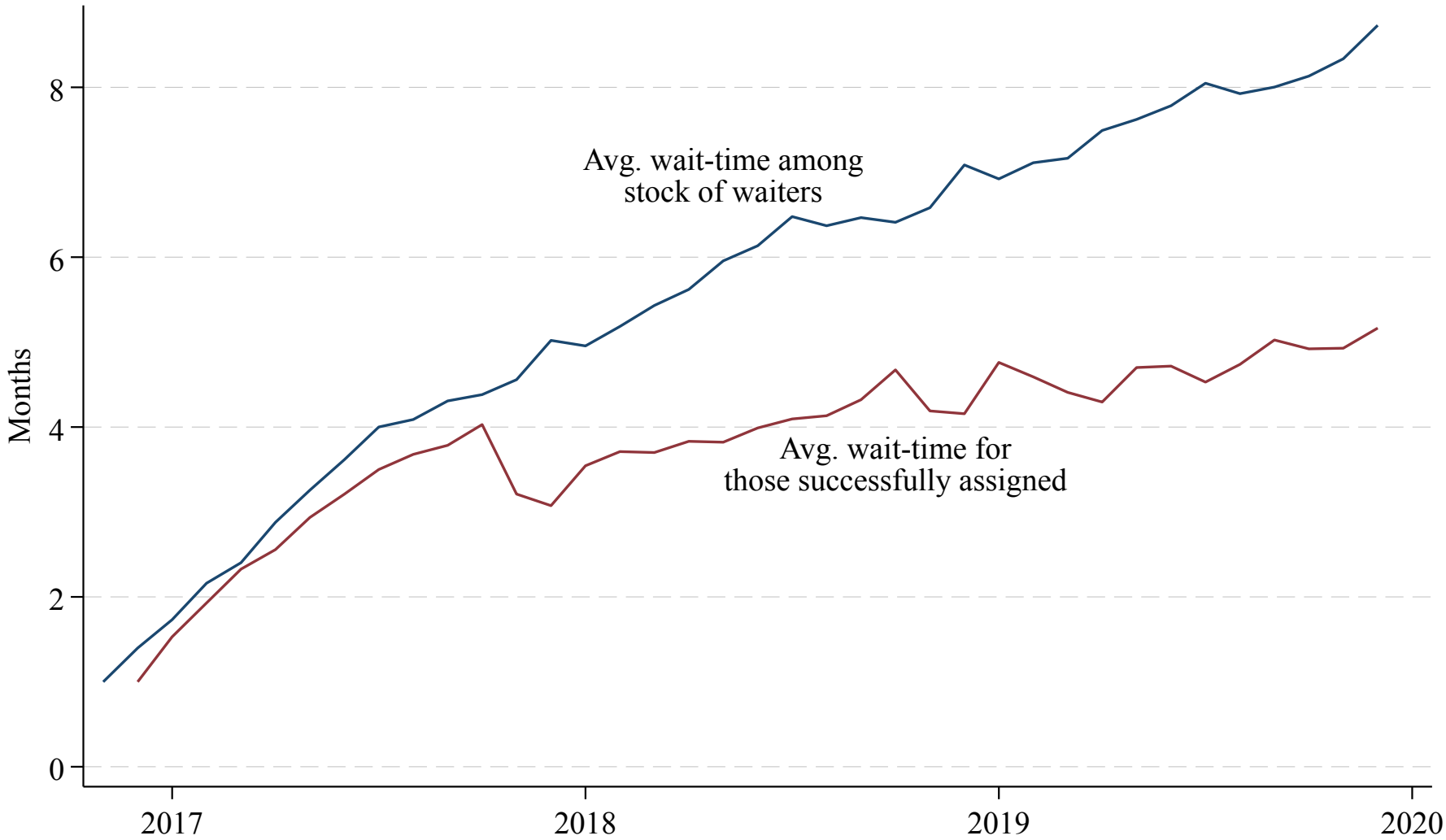
Notes: Based on 48 months 2016–2019. Oversubscribed = full for 75% of months.

⇒ Oversubscribed GPs more **female**, more **urban**, more **native-born**

Number of GP switches and use of waitlists



Waiting times



Who is switching GPs and using waitlists?

	Never used waitlist		Ever used waitlist
	Never switched	Ever switched	
Pct. of individuals	0.78	0.14	0.08
Demographics			
Pct. female	0.48	0.51	0.64
Pct. born in Norway	0.79	0.70	0.74
Pct. rural	0.31	0.29	0.28
Age	49	41	41
Pct. ever moved	0.07	0.35	0.29
Choice of GP			
Pct. ever switched to open GP	0.00	1.00	0.34
Pct. with GP of same gender	0.58	0.60	0.57
Travel time to GP (min.)	9	16	14
Healthcare utilization			
Annual outpatient utilization (USD)	483	507	594

Notes: Over-16 only. Based on 48 months 2016–2019.

1. Setting

2. Simulations (holding behavior fixed)

3. Empirical strategy (to predict counterfactual behavior)
   - Reduced form evidence

4. Conclusion

Simulation model

During the course of a month, a person may

- Elect to switch to an open GP
  or
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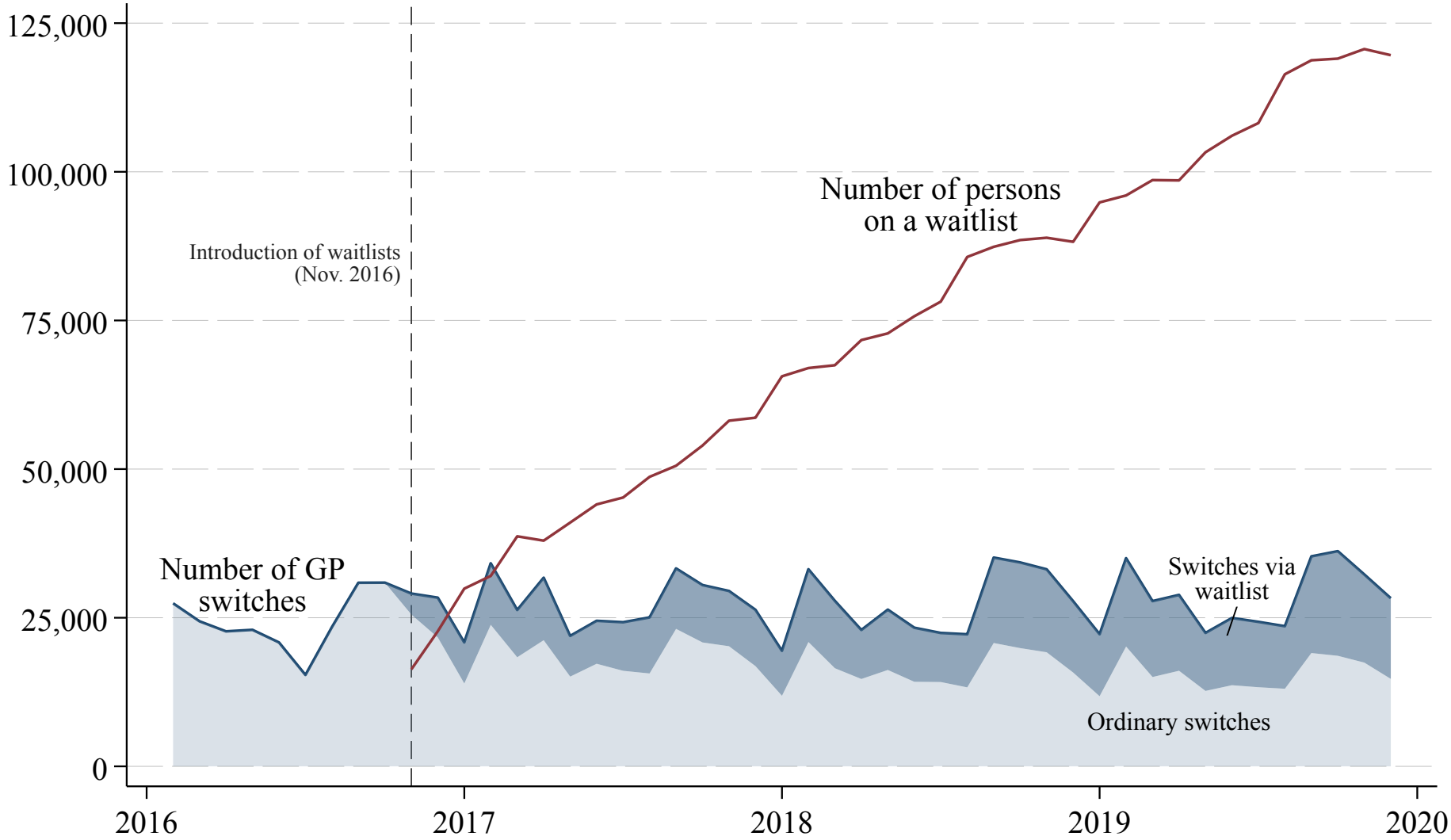
Then "between" months

1. System entries (eg births), exits (eg deaths)
2. GP panel cap updates, GP entry, GP exits
3. Switches to open GPs are processed
4. Open slots filled from waitlists
5. (new) Run TTC

Simulation model

	Sim. w/o demand	Sim. w/ demand
During the course of a month, a person may		
• Elect to switch to an open GP *or* • Join a waitlist for a full GP	exog.	endog.
or • Take no action	exog.	exog.
Then "between" months		
1 System entries (eg births), exits (eg deaths)	exog.	exog.
2 GP panel cap updates, GP entry, GP exits	exog.	exog.
3 Switches to open GPs are processed	endog.	endog.
4 Open slots filled from waitlists	endog.	endog.
5 (new) Run TTC		

Simulation results: Number of waiters *FCFS*



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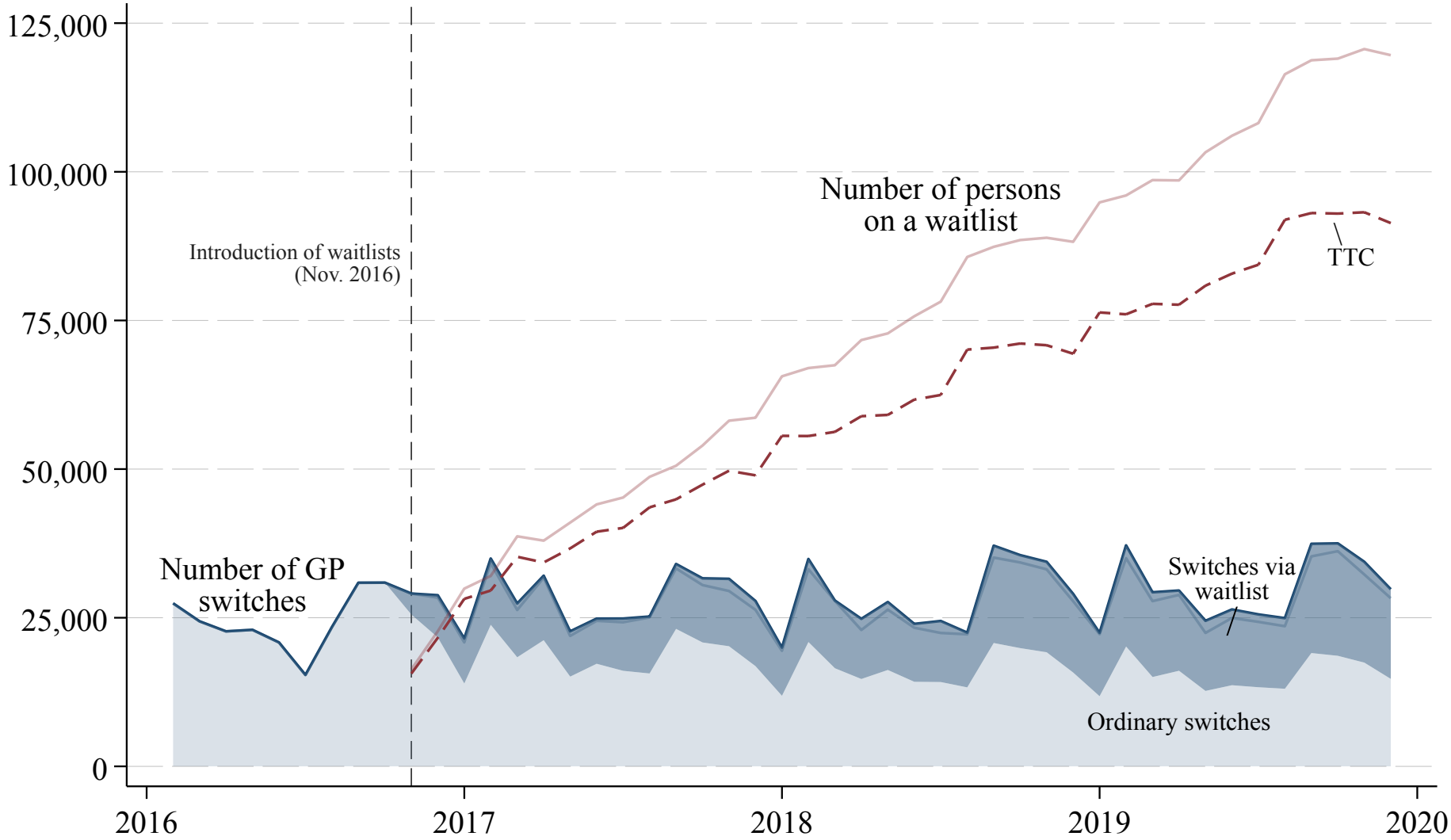
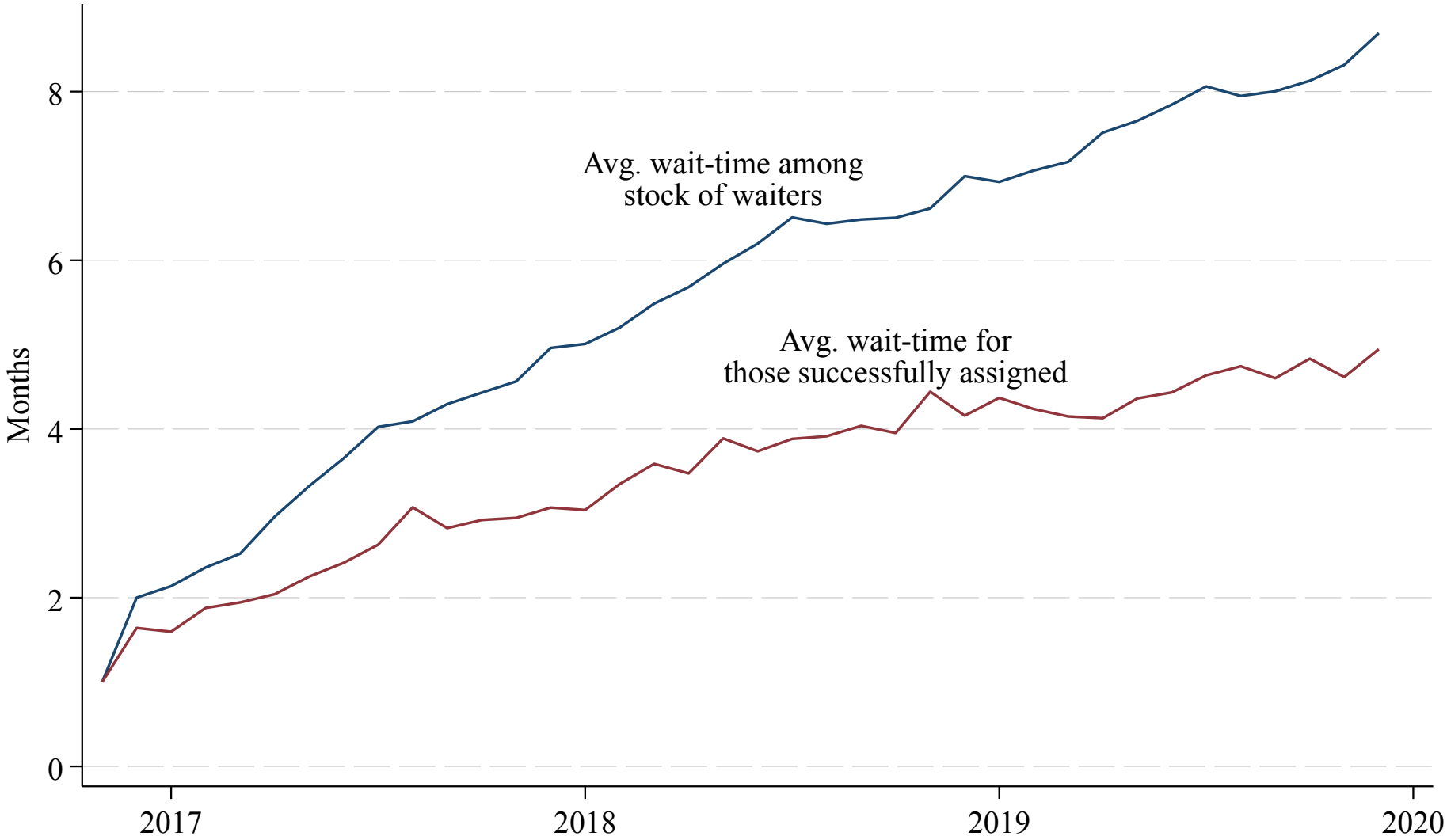


Simulation results: Wait times *FCFS*



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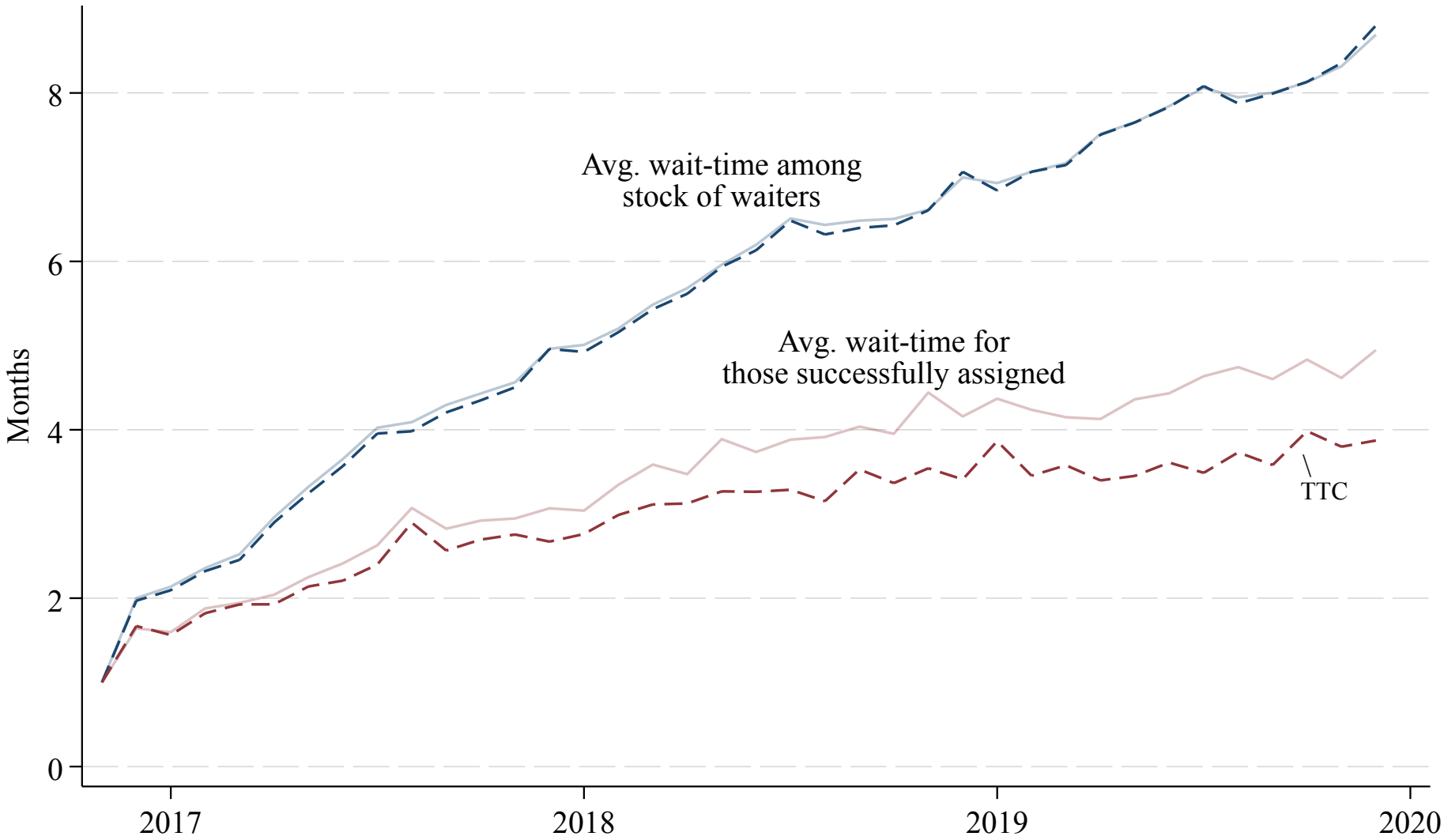
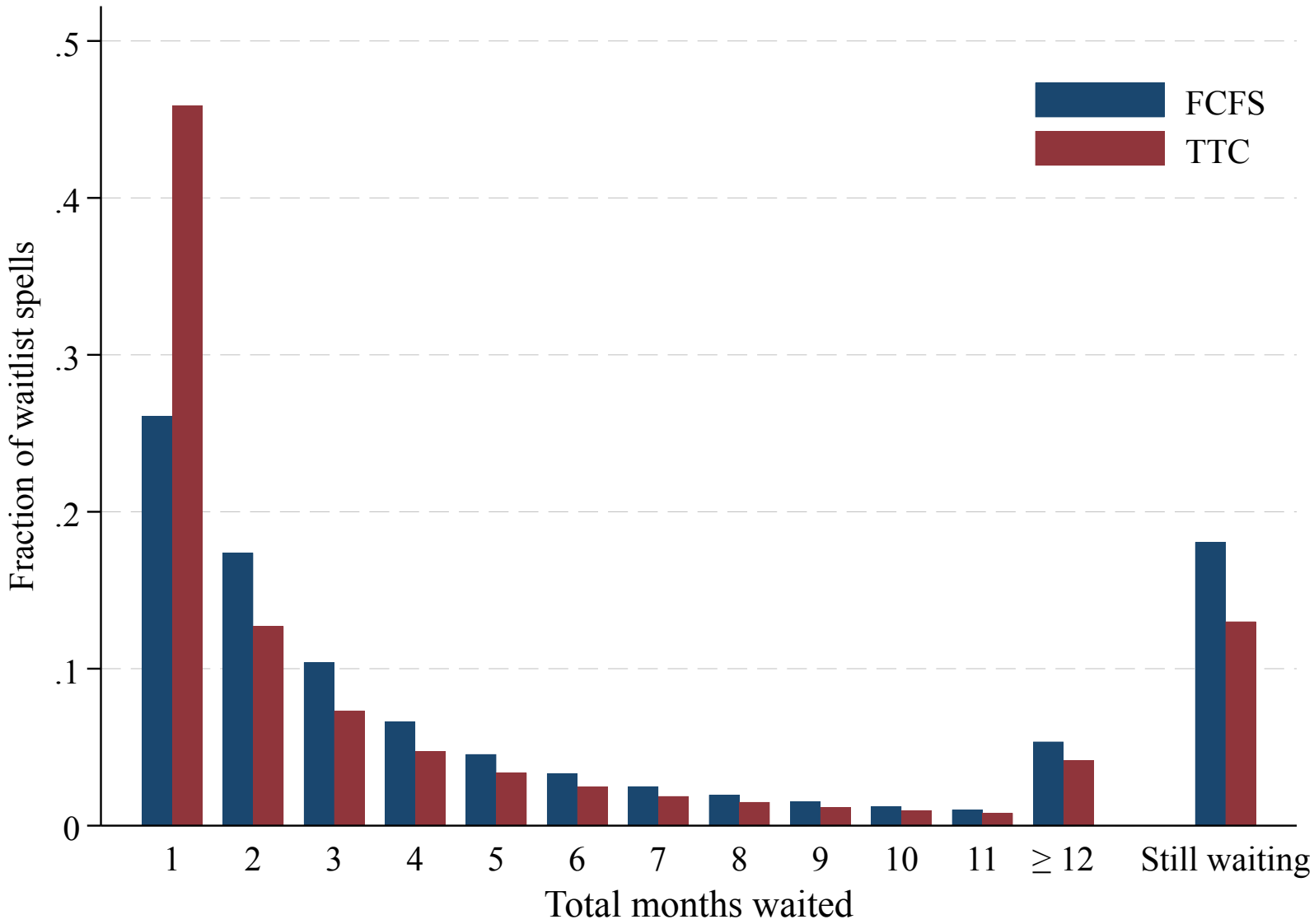
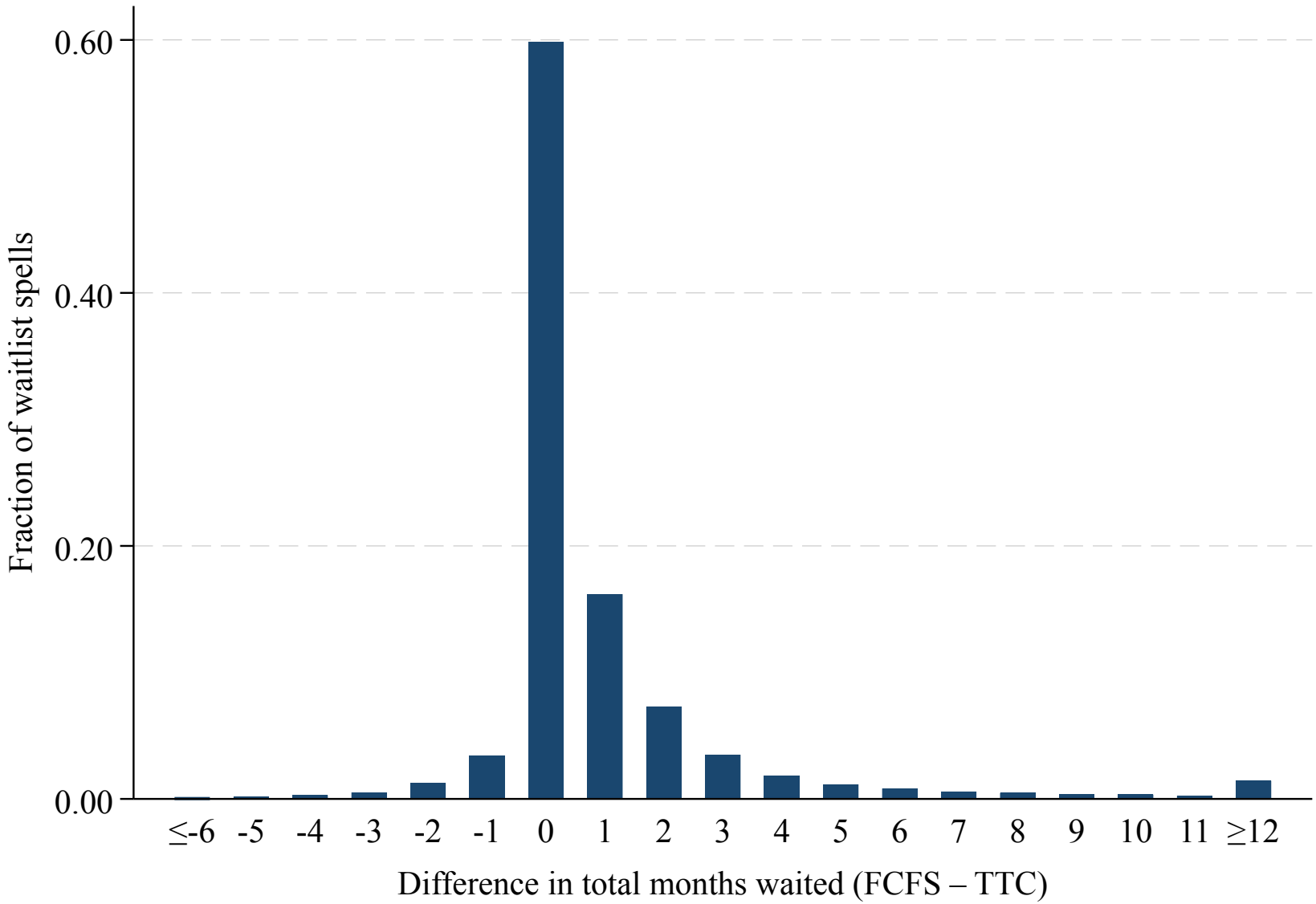


TTC assigns more people right away



Most people are better off (but not all)



Who benefits most?

Subsample	Pct. of Population	Pct. of Waitlist Spells	Mean Months Waited		
			FCFS	TTC	FCFS – TTC
All		1.00	4.7	3.9	0.9
Age and gender					
Female, < 35					
Female, > 35					
Male, < 35					
Male, > 35					
Temporary resident					
Urban/rural					
Rural					
Urban					
Ever moved					
Ever moved					
Never moved					
Current GP as of waitlist join					
Oversubscribed					
Undersubscribed					

Notes: Based on 585,899 total waitlist spells.

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All		1.00	4.7	3.9	0.9
Age and gender					
Female, < 35	0.14	0.30			
Female, > 35	0.34	0.29			
Male, < 35	0.15	0.15			
Male, > 35	0.33	0.18			
Temporary resident	0.03	0.08			
Urban/rural					
Rural	0.31	0.26			
Urban	0.69	0.74			
Ever moved					
Ever moved	0.21	0.43			
Never moved	0.79	0.57			
Current GP as of waitlist join					
Oversubscribed	0.64	0.60			
Undersubscribed	0.36	0.40			

Notes: Based on 585,899 total waitlist spells.

Who benefits most?

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All		1.00	4.7	3.9	0.9
Age and gender					
Female, < 35	0.14	0.30	4.7	3.7	0.9
Female, > 35	0.34	0.29	5.3	4.4	0.9
Male, < 35	0.15	0.15	4.0	3.1	0.8
Male, > 35	0.33	0.18	4.7	3.9	0.8
Temporary resident	0.03	0.08	4.5	3.7	0.8
Urban/rural					
Rural	0.31	0.26	5.5	4.7	0.8
Urban	0.69	0.74	4.4	3.5	0.9
Ever moved					
Ever moved	0.21	0.43	4.2	3.3	0.9
Never moved	0.79	0.57	5.2	4.3	0.9
Current GP as of waitlist join					
Oversubscribed	0.64	0.60	4.8	3.5	1.2
Undersubscribed	0.36	0.40	4.7	4.3	0.3

Notes: Based on 585,899 total waitlist spells.

→ Younger women, temp. residents, movers, and those endowed with desirable GPs

Is it fair? How big of a deal is "envy"?

- Under TTC, 30% of waitlist spells envy at least one person

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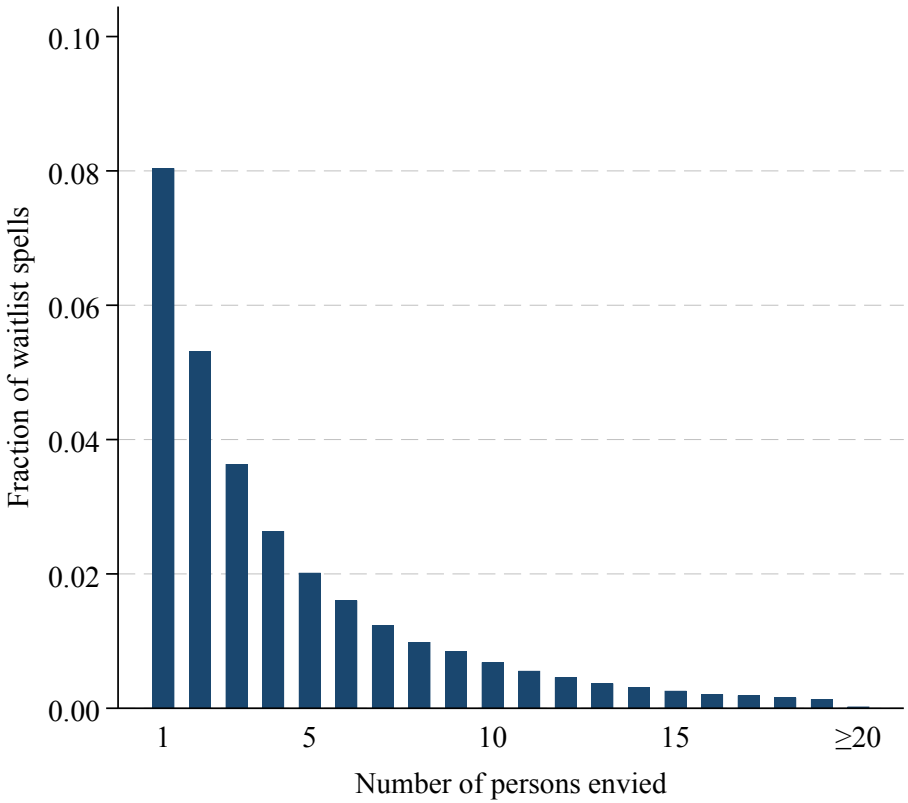
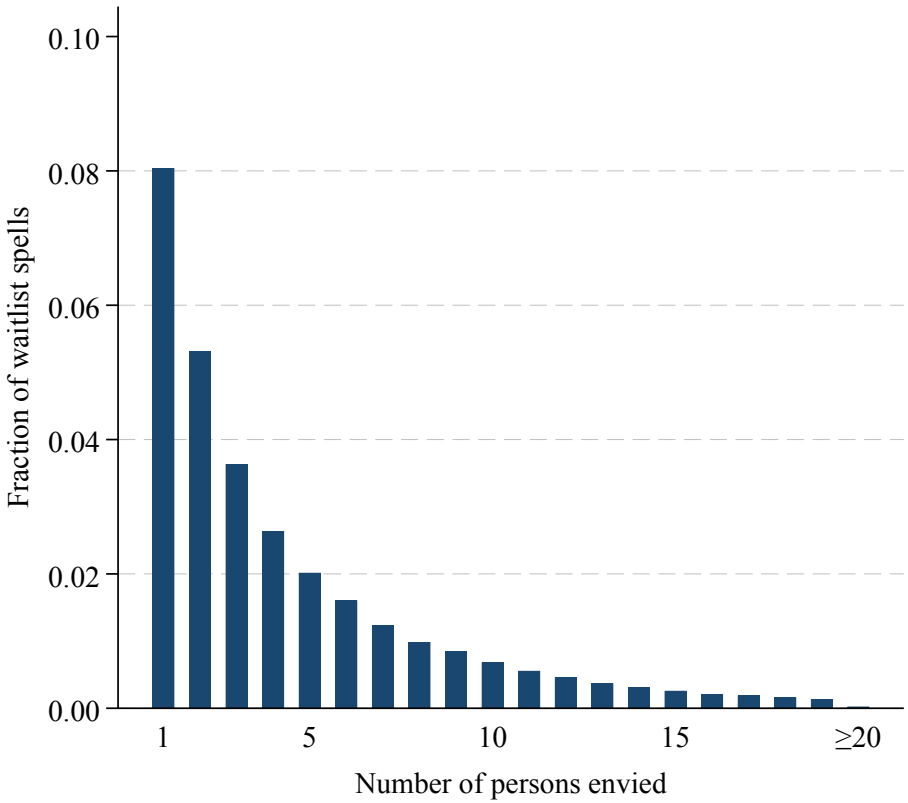
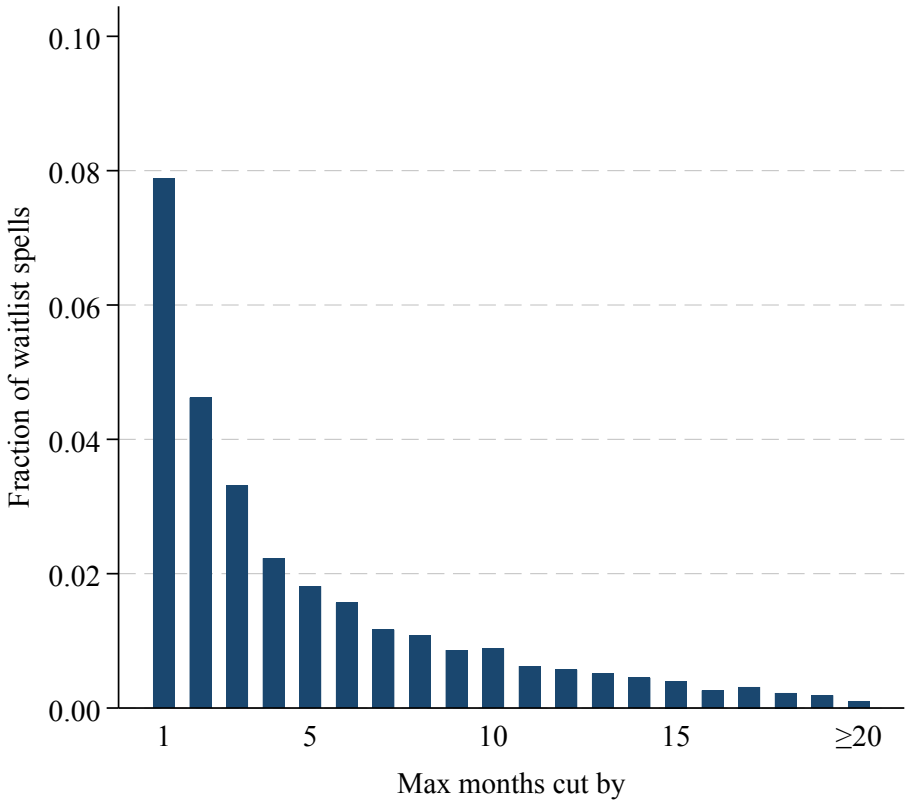


Is it fair? How big of a deal is "envy"?

- Under TTC, 30% of waitlist spells envy at least one person



- If someone is "cut", most often just by one month, but sometimes more..



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2. Simulations (holding behavior fixed)

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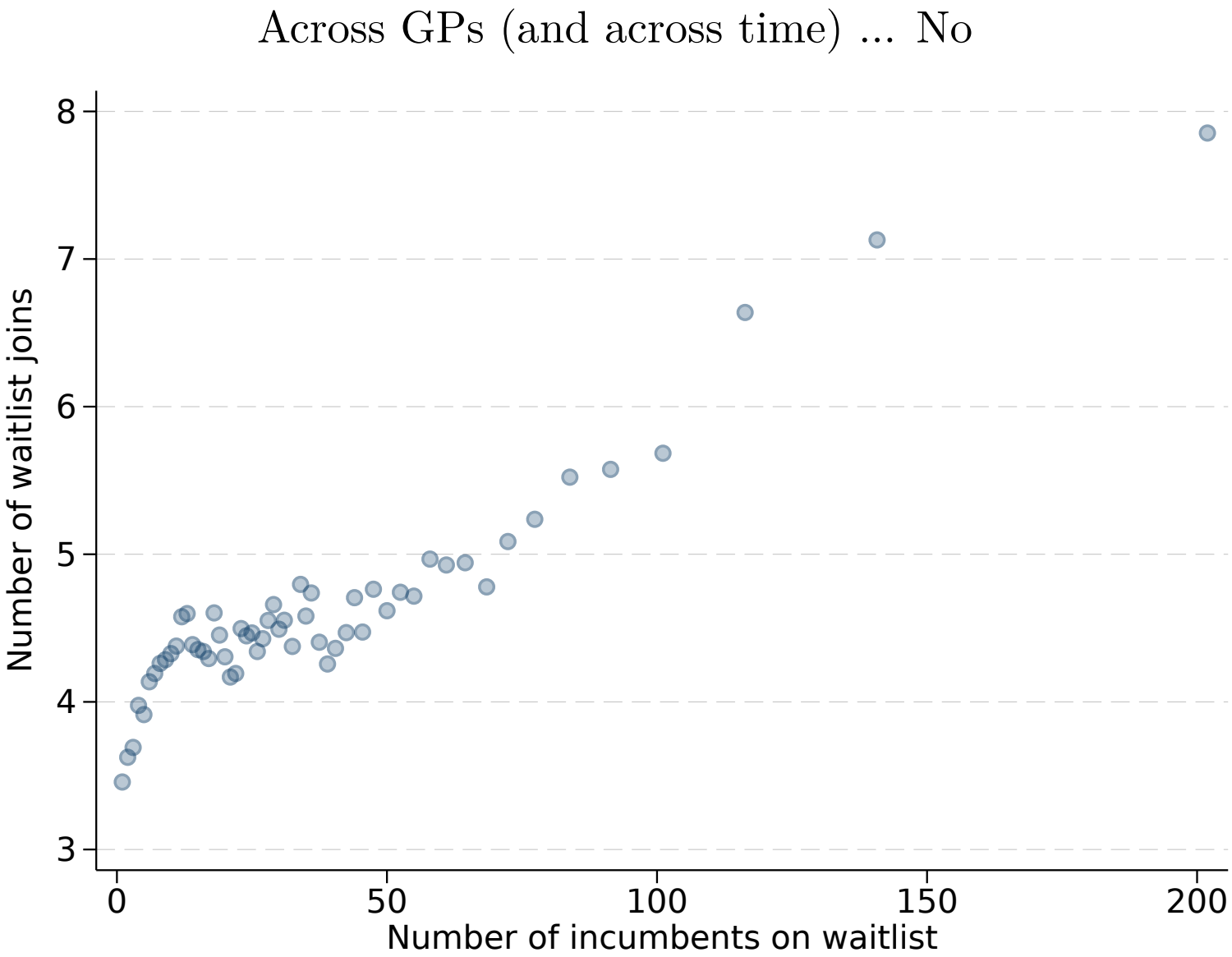
   - Reduced form evidence

4. Conclusion

Do longer waitlists mean fewer waitlist joins?



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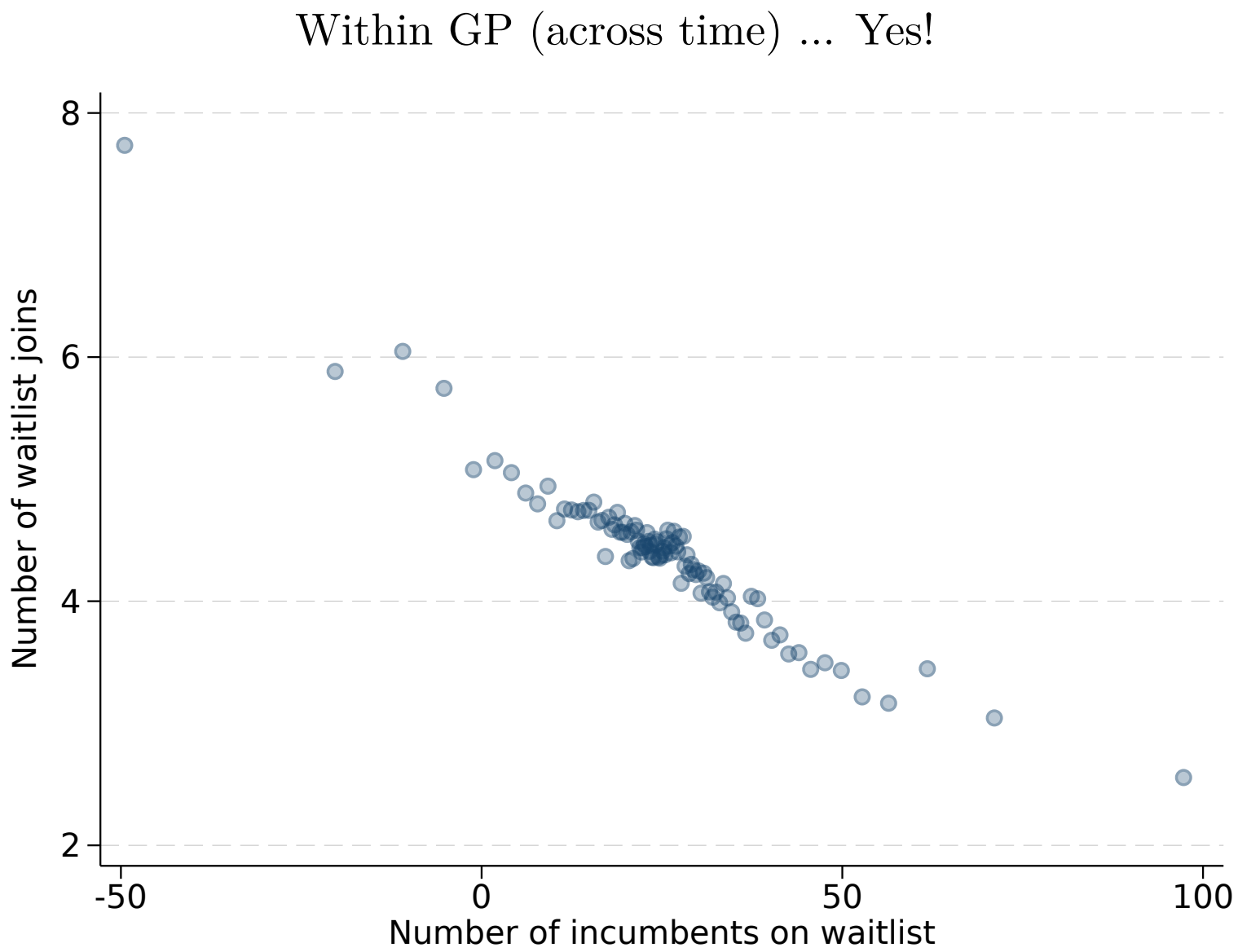

How important is wait-time in choice of GP?

Conditional logit of chosen GP, conditional on switching

	(1)	(2)
Travel time to GP (min.)	−1.000***	−1.000***
	(0.004)	(0.050)
Waitlist length	−0.162***	−0.058***
	(0.001)	(0.001)
Inside opt. GP	−8.030***	
	(0.045)	
Inside opt. GP x Female patient	−1.818***	−1.049 * *
	(0.046)	(0.249)
Inside opt. GP x Female patient x Female GP	3.975***	1.894***
	(0.020)	(0.246)
Inside opt. GP x Male patient x Male GP	1.840***	0.342
	(0.023)	(0.246)
GP FE		Yes
Inside opt. GP x Month		Yes
Observations	4,642,987	4,642,987

Notes: Limited to switchers/waitlist joiners in Trondheim kommune in 2018–2019 (19,821 individuals). Choiceset is all GPs within 25 minutes (avg. 205 inside GPs each month). Outside option is all other GPs.

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Concluding thoughts

Can smarter market design offer meaningful improvements in this setting?

$\Rightarrow$ Looks like yes!

Open questions

- Do more complicated mechanisms offer substantially larger gains?
- Is there a lot at stake? Does it really matter a lot that people get to have the GP they want?

Broader questions

- What is the value of formal panel caps (like in Norway) vs. market clearing via wait-time to appointment (like in UK, Canada)?
- Is revealed preference the appropriate way to evaluate welfare?