

Vertically disintegrated platforms

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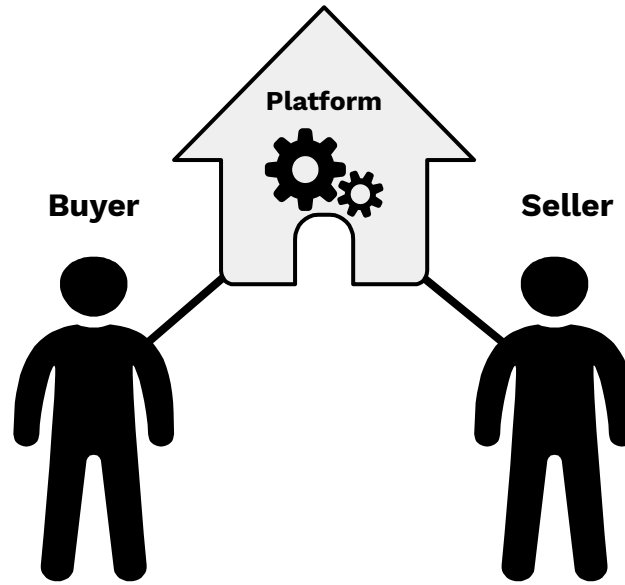
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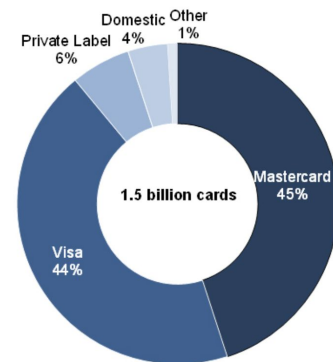
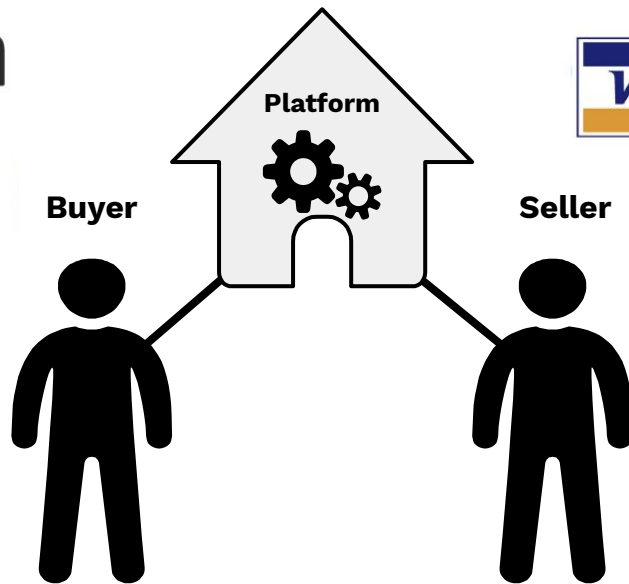
³ KU Leuven

OeNB
Vienna, 2019



The standard (multi-sided) platform model (Rochet and Tirole (2003,2006))

- Direct and indirect **network effects** → **Natural monopoly**
- **Full control** over fees on all sides
- **Asymmetric price structure** with heterogeneous elasticities



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Inadequate consumer welfare frameworks
Major regulatory challenges

(EU Commission, US Supreme Court, etc.)

Supreme Court Sides With American Express on Merchant Fees

Schumpeter

America's antitrust apparatus prepares to act against big tech

A University of Chicago conclave of experts debates how far to go



Antitrust theatre

Google is fined €4.3bn in the biggest-ever antitrust penalty

But America's online giants have not much more to fear from regulators



David Ryder

NITASHA TIKU BUSINESS 06:04:17 06:15 PM
DIGITAL PRIVACY IS MAKING ANTITRUST EXCITING AGAIN



“Regulators should **refrain from mechanically applying standard antitrust ideas** where they do not belong.”

Tirole, AER, 2015

Analysis **Technology** 2 min

How did the biggest tech companies end up without competition?

JUNE 10, 2019

JUNE 18, 2018 | LOUISE MATSAKIS

The Supreme Court Will Decide If Apple's App Store Is a Monopoly

Apple Inc. v. Pepper could have wide-reaching implications not only for the Cupertino, California, giant, but also for other companies like Amazon.

JUNE 3, 2019 | FRED VOGELSTEIN AND NITASHA TIKU

The New Antitrust Scrutiny Should Worry Silicon Valley

Reports say the federal government is considering antitrust probes of Google and Amazon. Big Tech could be a bogeyman for both sides in the 2020 election.



Analysis **Technology regulation**

Global regulators' net tightens around big tech

...dominance of the digital advertising market, perceived **monopoly** on internet users' personal data and treatment of third parties. Earlier this year Germany's antitrust watchdog ruled that the social...

JUNE 5, 2019



EU financial regulation

Visa and Mastercard to cut foreign card fees in EU

...Mastercard and Visa will cut the fees they charge on purchases made in the EU with foreign-issued debit and credit cards, a concession the payment companies hope will end their long-running **antitrust**...

APRIL 29, 2019

The FT View **The editorial board**

The US needs **antitrust** law for the 21st century

..., rather than their cash. Mr Hughes instead draws on the “new Brandeis” school of **antitrust** thinking, as proposed by the lawyer Lina Khan or Senator Elizabeth Warren. Proponents argue that regulators should...

MAY 15, 2019



New model of platform governance

Distributed ledger technology allows group of agents to coordinate of common state of the world w/o intermediaries



Source: Conti et al., 2017

*“In theory, blockchain technology can be used to **overcome the coordination challenges that otherwise lead network effects to be a source of market power**”*

Catalini and Tucker (2018)

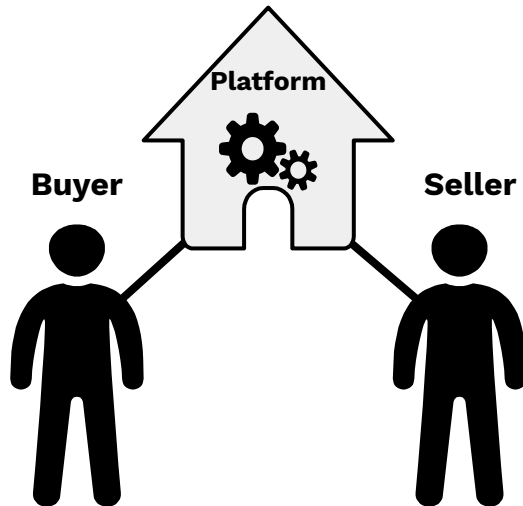
Is DLT a **technology driven market solution** to the issue of **consumer welfare** and **antitrust** in digital economies?

New model of platform governance

Distributed ledger technology allows group of agents to coordinate of common state of the world w/o intermediaries



Vertical disintegration

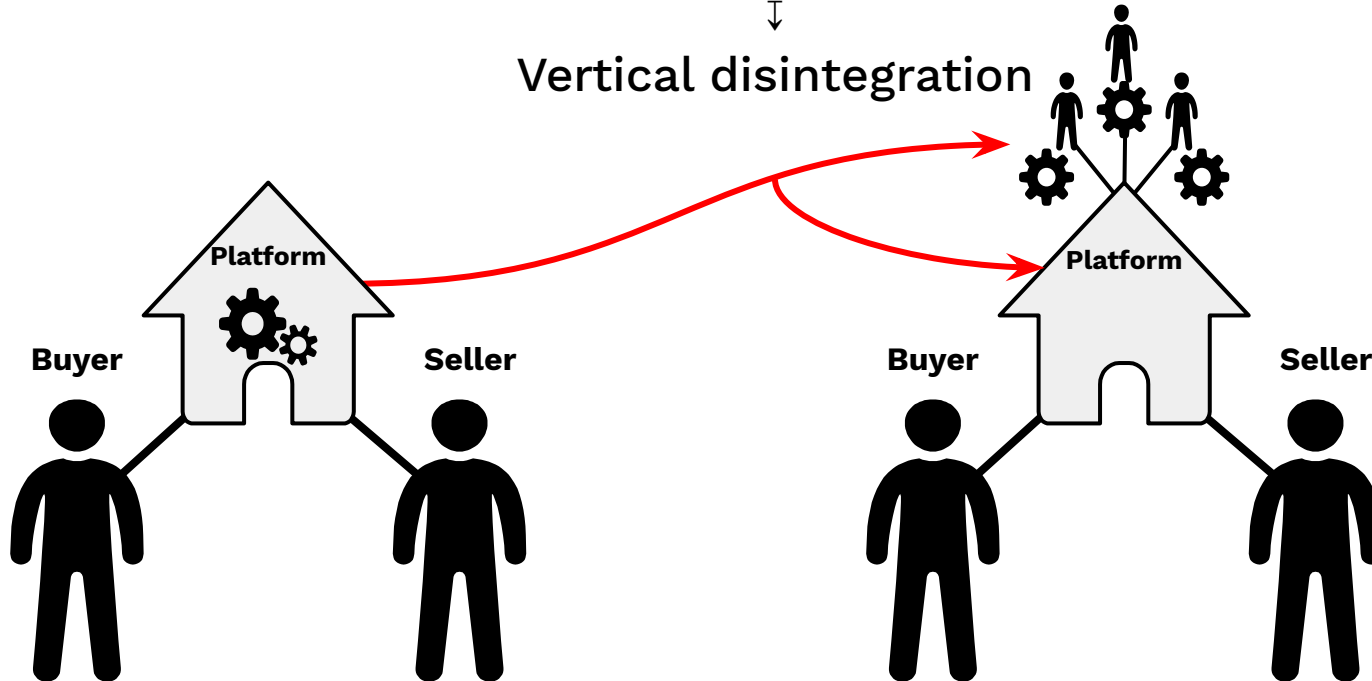


New model of platform governance

Distributed ledger technology allows group of agents to coordinate of common state of the world w/o intermediaries



Vertical disintegration

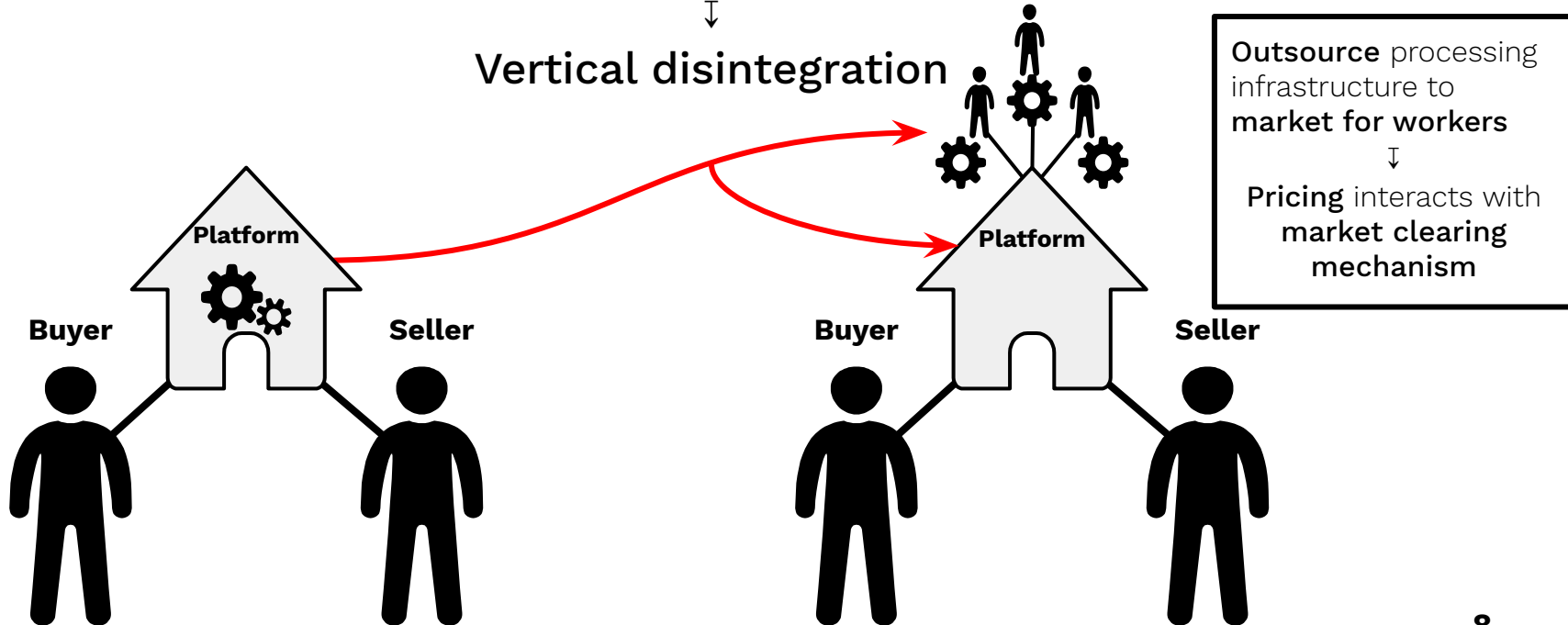


New model of platform governance

Distributed ledger technology allows group of agents to coordinate of common state of the world w/o intermediaries

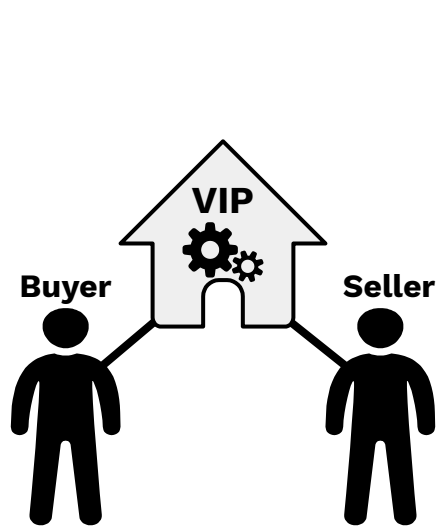


Vertical disintegration

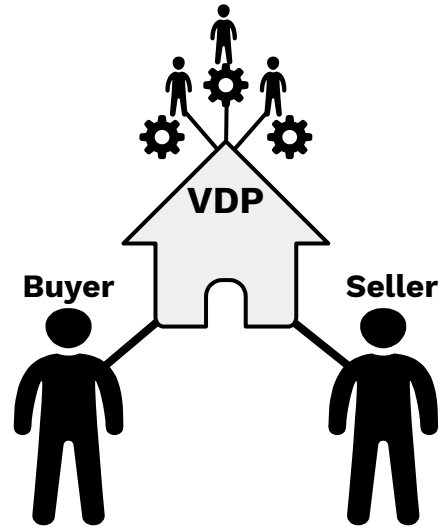


In this paper

Welfare implication of vertical disintegration?



Vertically Integrated Platform



Vertically Disintegrated Platform

Contribution

1. **Broaden** the debate on welfare in platforms
 - **technologically driven market solution** to market power
 - link multiple strands of the literature
2. **Mapping** of current **payment** applications
 - micro-foundation of the integration cost
 - welfare **implications of current designs**
3. **Derive guidelines** for regulation and design policies

Model

VDP Model

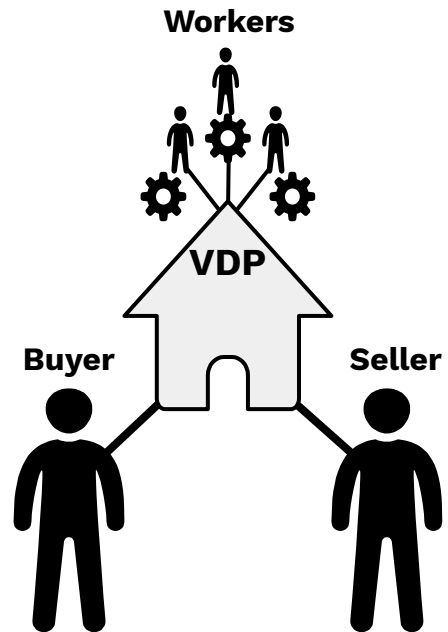
Extension of Rochet and Tirole (2006)

Agents

- **Users** (Buyers and Sellers)
 - Utility from interacting on platform: b^B, b^S
 - Transaction fee: a^B, a^S
- **Workers**
 - Revenue from processing transactions:
 $r(p,t)$
 - $p = a^B + a^S$
 - $t =$ tax set by platform
 - Technology cost c_i
- **Platform**
 - Sets (z,t) to maximize profit
 z such that: $a^B = p + z/2$ and $a^S = p - z/2$
 - $\pi = ptS(t,p) - C$

Market

- **Welfare:** $D = N^B N^S$
- **Market clearing:** $S(t,p) = D = N^B N^S$



VIP Model

Rochet and Tirole (2006)

Agents

- **Users** (Buyers and Sellers)
 - Utility from interacting on platform: b^B, b^S
 - Transaction fee: a^B, a^S

~~Workers~~

~~Revenue from processing transactions:~~

~~$r(p, t)$~~

~~$p = a^B + a^S$~~

~~$t = \text{tax set by platform}$~~

~~Technology cost c_i~~

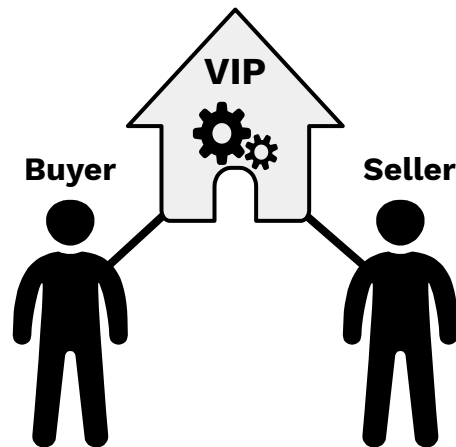
- Platform

- Sets (p, z) to maximize profit
 - $\pi = D - C(D)$

Market

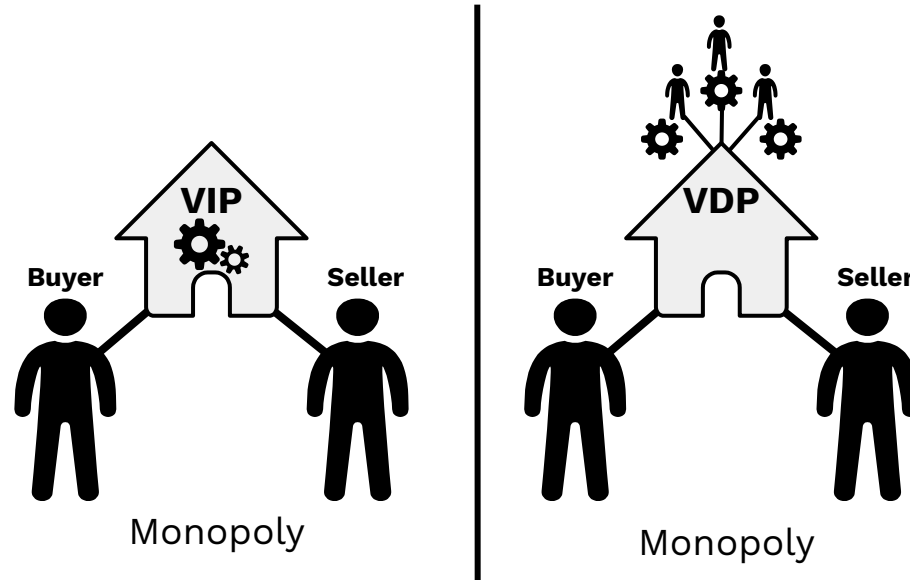
- **Welfare:** $D = N^B N^S$

~~Market clearing: $S(t, p) = D = N^B N^S$~~



Results

Plan

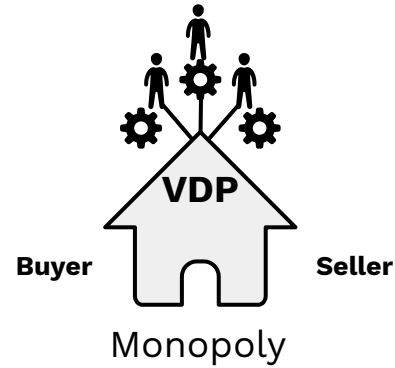
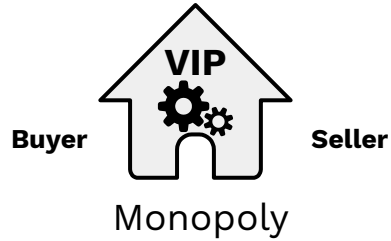


Price structure

Welfare analysis

Exogenous tax, endogenous tax, integration costs

Price structure

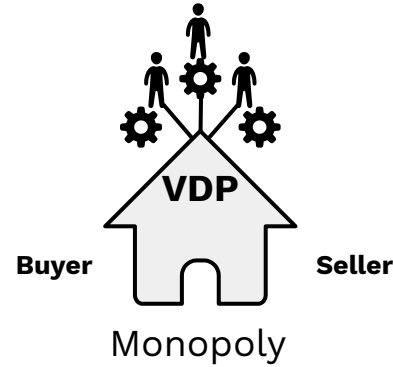
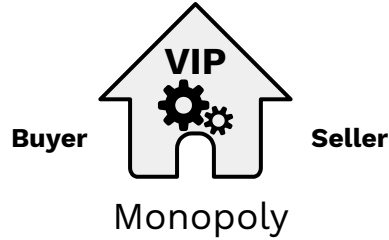


$$z_I^*, p_I^* = \operatorname{argmax}_{(z,p)} \pi_I(p, z)$$

$$z_D^* = \operatorname{argmax}_z \pi_D(p, z)$$

s.t. $p = p_D^* | D(p_D^*, z) = S(p_D^*, t)$

Price structure



$$z_I^*, p_I^* = \operatorname{argmax}_{(z,p)} \pi_I(p, z)$$

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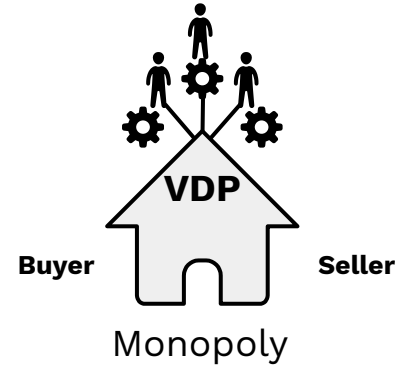
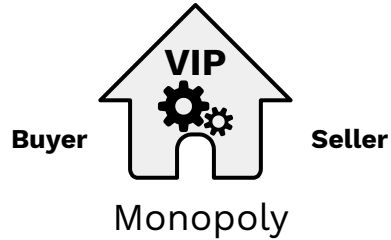
$$\text{s.t. } p = p_D^* | D(p_D^*, z) = S(p_D^*, t)$$

Proposition

The equilibrium price structure in the VDP and VIP setting maximizes total interaction volume at the equilibrium usage fee.

$$z_D^*(p) = z_I^*(p) = \operatorname{argmax}_z D(p, z)$$

Price structure



Proposition

The equilibrium price structure in the VDP and VIP setting maximizes total interaction volume at the equilibrium usage fee.

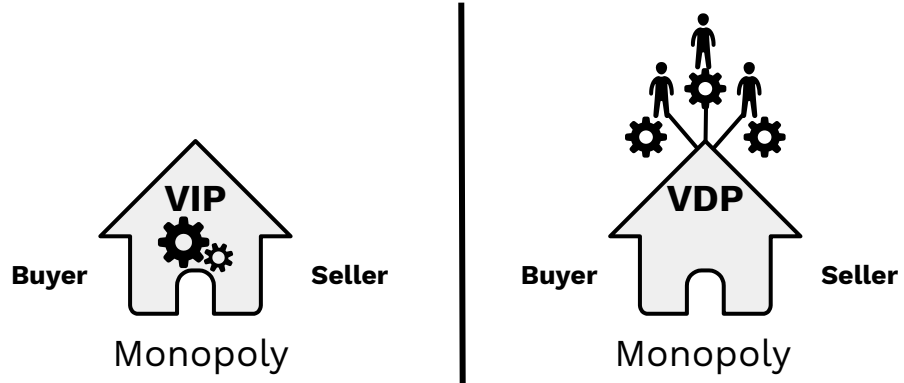
$$z_D^*(p) = z_I^*(p) = \operatorname{argmax}_z D(p, z)$$

Welfare analysis
focus on **price level**

Proposition
Adapted Lerner (Rochet and Tirole, 2006)
formula applies to VDP

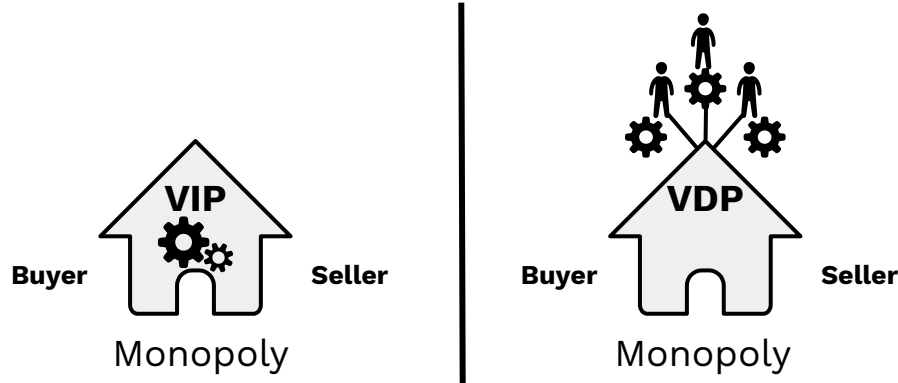
Welfare analysis

Assume $C(D) = C$ and **exogenous tax**



Welfare analysis

Assume $C(D) = C$ and **exogenous tax**



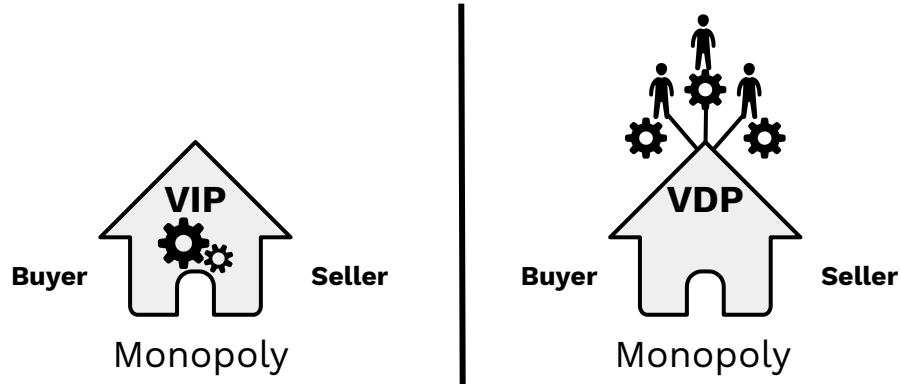
Proposition

For some VDP tax parameter t , in equilibrium VDP demand will exceed VIP demand iif

$$t < t_I = t(p_I^*, z_I^*)$$

Welfare analysis

Assume $C(D) = C$ and **endogenous tax**

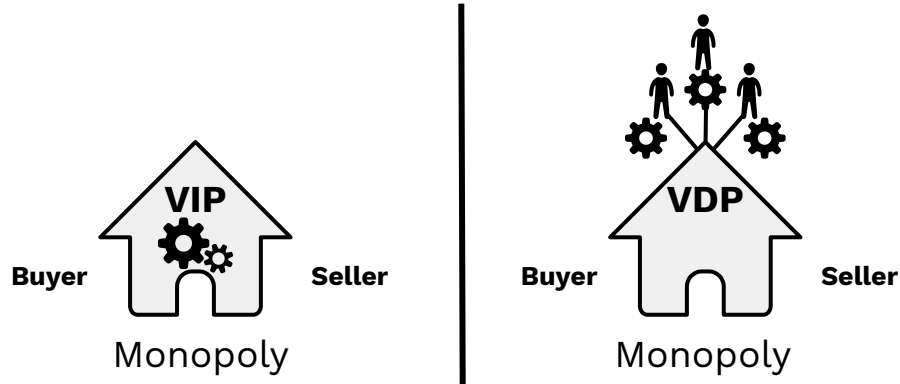


Proposition

In equilibrium, when the VDP chooses t to maximize its profit, usage fees are higher and welfare is lower compared to the VIP case

Welfare analysis

Assume $C(D) = C$ and **endogenous tax**



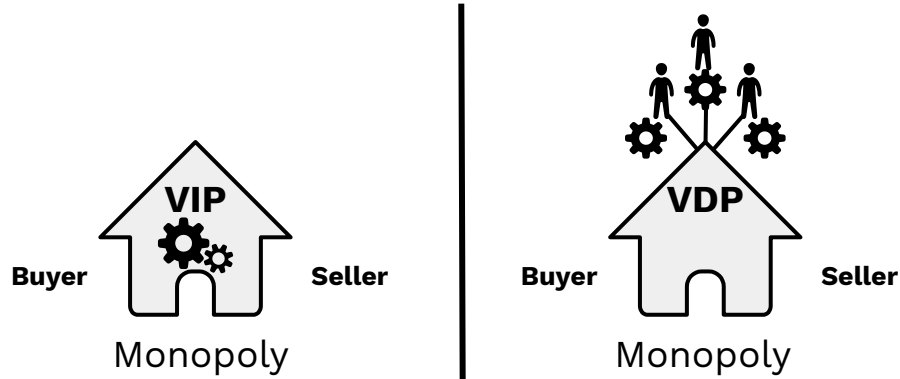
Corollary

The user welfare under the VDP will dominate user welfare under the VIP if the tax parameter is constrained such that for some \underline{t} we have

$$t < \underline{t} \leq t_I = t(p_I^*, z_I^*)$$

Welfare analysis

Assume $C(D) = C$ and **endogenous tax**



Corollary

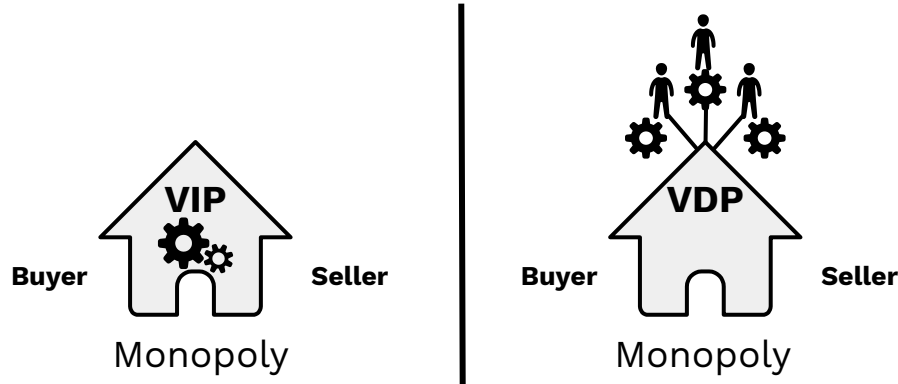
The user welfare under the VDP will dominate user welfare under the VIP if the tax parameter is constrained such that for some \underline{t} we have

$$t < \underline{t} \leq t_I = t(p_I^*, z_I^*)$$

Regulatory intervention
Limit on the tax

Welfare analysis

Assume $C'(D) > 0$ and endogenous tax



Proposition

In equilibrium, when the VDP chooses t to maximize its profit and the VIP faces integration costs $C(D)$, user welfare under the VDP dominates the VIP if the rate of change of integration costs at the VIP optimal price is sufficiently large.

Overview

Results

- **Price structure equivalence** for customers
- When **integration cost depends on demand**
VDP > traditional platforms
- When integration cost is negligible
If VIP is left **unregulated**
VDP < traditional platforms
If **regulatory limits** on tax charged to workers
VDP > traditional platforms

Application to payment systems

VDP example

Zero tax platforms



- Not-for-profit platform
- Zero tax: $t = 0$
- Price structure: $z = p/2$
- Price level: miners market

↑ **welfare**

Zero tax



↓ **welfare**

Inefficient price structure
(multi-sidedness)

VIP example

For-profit platforms



- For-profit platform
- Implicit tax: $t_i > 0$
- Price level and structure: $z_I^*, p_I^* = \operatorname{argmax}_{(z,p)} \pi_I(p, z)$

↑ **welfare**

Efficient price structure

↓ **welfare**

Implicit tax
(integration costs?)

Opportunities

Central bank digital platforms



Welfare maximising design

VDP

- Price structure adjustments \uparrow **welfare**
- Low tax \uparrow **welfare**
- Low cost of implementation and maintenance

Conclusion

- Platforms have taken a prominent role in the digital economy. Given the **quasi-monopoly** positions of several online platforms, understanding the **welfare implications** of novel platform designs has become crucial.
- In this paper: we investigate a **technology driven market solution**
 - ↳ **Distributed ledger technology**
- Desirability of disintegrating platforms
 - ↳ **Regulation & integration-demand costs**
- Current applications exhibit ambiguous designs
 - ↳ **Room for a dominating solution**
- Results provide guidelines to
 - Promoting platform welfare
 - Regulating new forms of digital platforms
 - Design of public utility platforms based on DLT
 - ↳ **Central Bank Digital Payment/Currency infrastructure**

Thank you!

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