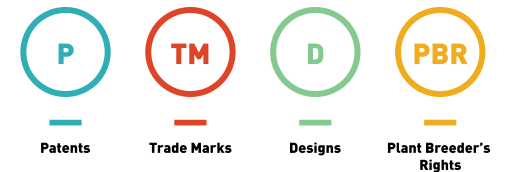




# IP Rights, Business Profitability and Market Competition

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# Introduction

- The IP system: role, trade off and balance
- Evidence?

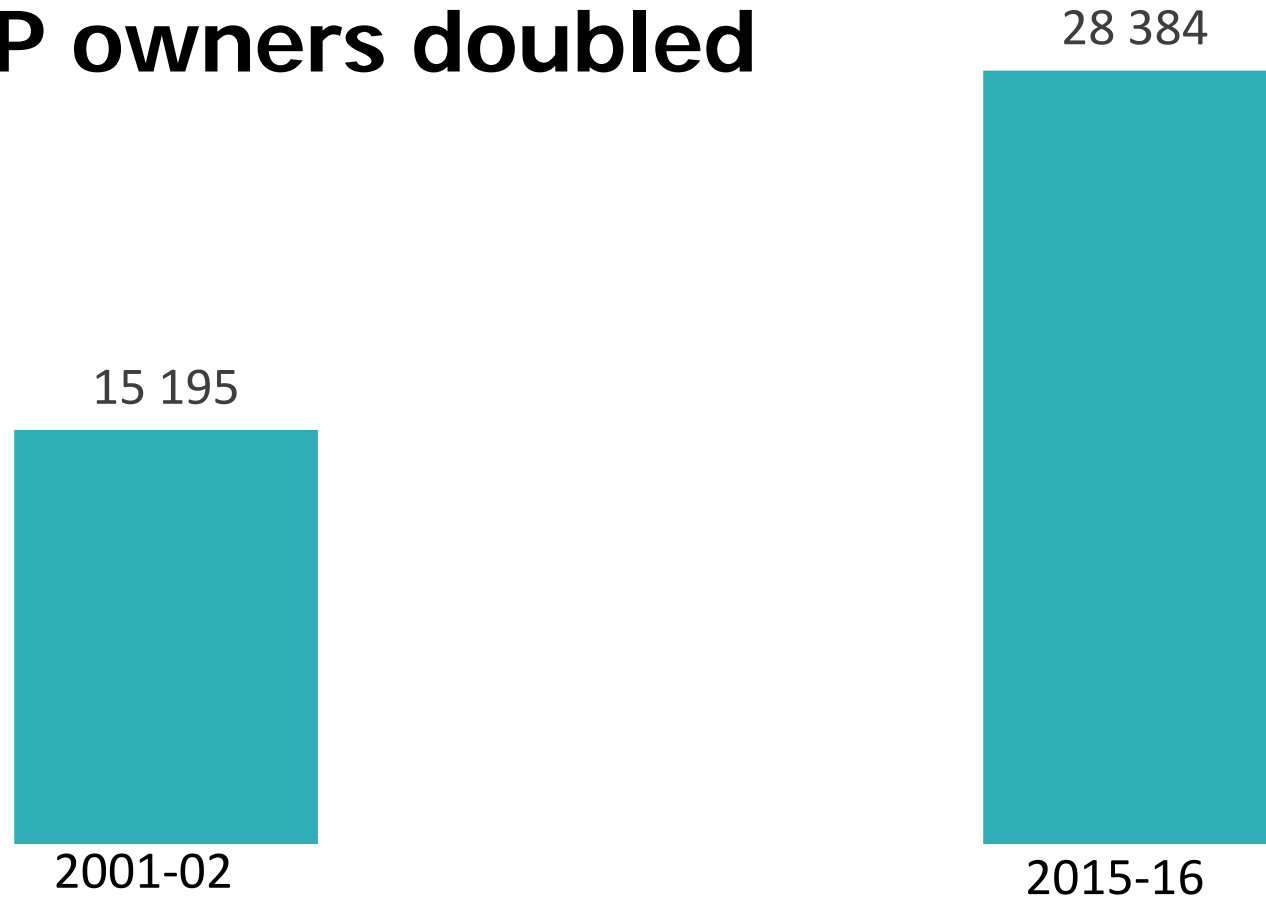


# IP owners

## Descriptive statistics



# IP owners doubled





## IPR owners have more employees and a longer life

	Avg no. employees	Avg age (yrs)
Non-owners of IPRs	6	8
<b>IPR owners</b>	<b>105</b>	<b>13</b>
Patents only	76	14
Trade marks only	75	12
Designs only	22	11
Patents and trade marks	416	18
Patents and designs	84	14
Trade marks and designs	281	15
<b>All three types of IPRs</b>	<b>736</b>	<b>21</b>



## IPR owners have higher profit

	Avg profit % invested capital	Avg profit \$/yr per employee
Non-owners of IPRs	4.8	23 404
<b>IPR owners</b>	<b>4.4</b>	<b>48 368</b>
Patents only	6.2	61 394
Trade marks only	3.2	37 109
Designs only	<b>10.2</b>	21 211
Patents and trade marks	6.4	<b>101 278</b>
Patents and designs	5.6	25 158
Trade marks and designs	6.5	27 366
<b>All three types of IPRs</b>	<b>7.8</b>	<b>52 068</b>

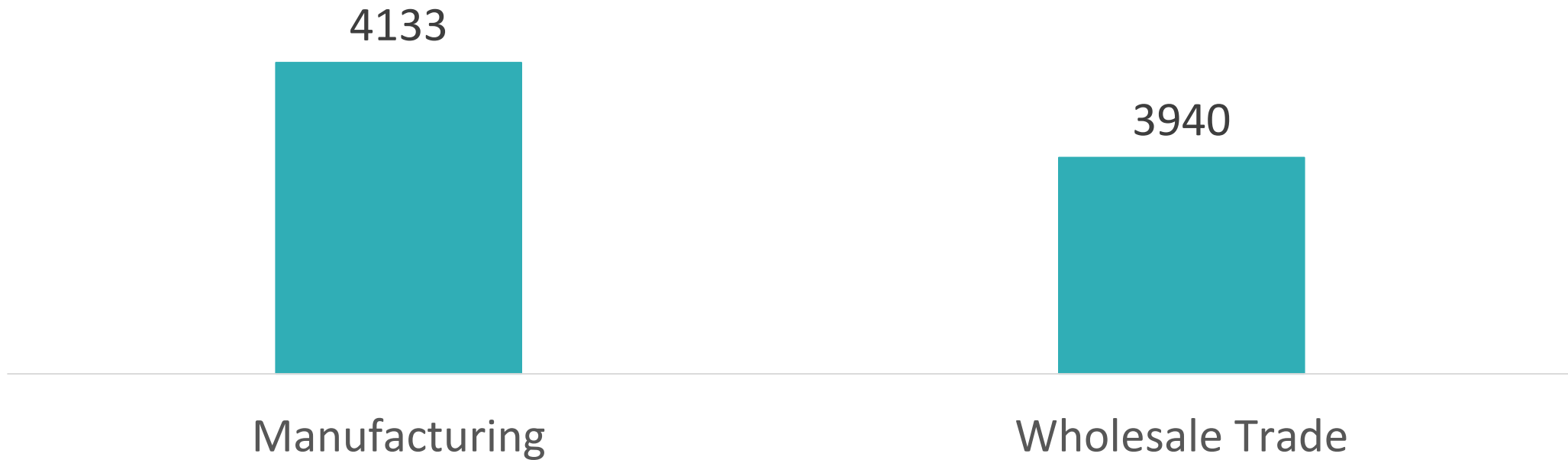


## Large businesses more likely to have IPRs - mostly trade marks only

	Large	SME	All
Non-owners of IPRs	56.1	96.8	96.5
<b>IPR owners</b>	<b>43.9</b>	<b>3.2</b>	<b>3.5</b>
Patents only	2.2	2.5	2.5
Trade marks only	73.6	88.7	87.3
Designs only	0.4	1.8	1.7
Patents and trade marks	11.2	3.0	3.7
Patents and designs	0.3	0.3	0.3
Trade marks and designs	4.0	2.4	2.6
<b>All three types of IPRs</b>	<b>8.4</b>	<b>1.3</b>	<b>1.9</b>



## IPR owners concentrated in Manufacturing and Wholesale Trade







# IPRs and profitability

## Econometric analysis



$$\log \pi_{i,t} = \alpha + \beta \log \pi_{i,t-1} + \gamma IP_{i,t} + \delta X_{i,t} + \varepsilon_{i,t}$$

- $\pi$  Profit per invested capital or per employee (log transformed)
- $X$  Control variables (eg business age, industry and year dummies)
- $\varepsilon$   $\varepsilon_{i,t} = U_i + V_{i,t}$  ( $U_i$  is time-invariant unobserved factor)

## One model with three approaches

1. IP ownership: at least one registered IPR in a given year
2. Seven types of IPR dummies: PO, TO, DO, P\_T, P\_D, T\_D, P\_T\_D
3. Stocks of patents, trade marks and designs per employee



# IP rights increase profits for profitable firms

Dependent variable	System GMM	
	Log (profit / invested capital)	Log (profit / employee)
<b>IPR owners</b>	1.28 (2.56) <sup>***</sup>	1.24 (2.46) <sup>***</sup>
Patents only	1.19 (2.29) <sup>***</sup>	1.19 (2.29) <sup>***</sup>
<u>Trade marks</u> only	1.39 (3.01) <sup>***</sup>	1.16 (2.19) <sup>***</sup>
Designs only	0.43 (0.54) <sup>**</sup>	0.58 (0.79) <sup>**</sup>
Patents and <u>trade marks</u>	2.14 (7.50) <sup>***</sup>	1.76 (4.81) <sup>***</sup>
Patents and designs	0.66 (0.93)	0.99 (1.69) <sup>**</sup>
<u>Trade marks</u> and designs	1.77 (4.87) <sup>***</sup>	1.65 (4.21) <sup>***</sup>
All three IP rights	2.05 (6.77) <sup>***</sup>	1.64 (4.16) <sup>***</sup>



# I PRs and market concentration or competition

## Econometric analysis



## High market concentration or less market competition

ANZSIC code	NACE description	HHI (avg)
J58	Telecommunications Services	0.40
J57	Internet Publishing and Broadcasting	0.39
O76	Defence	0.37
I49	Air and Space Transport	0.35
C17	Petroleum and Coal Product Manufacturing	0.34
I51	Postal and Courier Pick-up and Delivery Services	0.32



## Basic model

$$\log HHI_{j,t} = \alpha + \beta \log HHI_{j,t-1} + \gamma IPR_{j,t} + \theta X_t + \varepsilon_{j,t}$$

Variable	Definition
HHI	Profit of invested capital (log transformed)
IPR	1 IPR-intensive industry dummies for patents, <u>trade marks</u> and designs 2 Stocks of patents, <u>trade marks</u> and designs per 1000 employees
X	Control variables, such as firm age and year dummies
$\varepsilon$	$\varepsilon_{j,t} = U_j + V_{j,t}$ ( $U_j$ is time-invariant unobserved factor)



## Do IP rights affect market concentration?

### No conclusive evidence

Explanatory variable		GMM	
		Difference	System
<b>Intensive industry</b>			
IPR-intensive industry dummies	Patents	-0.010	-0.060
	<u>Trade marks</u>	-0.080	-0.120
	Designs	-0.060	-0.190
<b>IPR / 1000 employees</b>			
Log stock intensity of all three IPRs	Patents	0.003	-0.100
	<u>Trade marks</u>	-0.220	-0.040
	Designs	0.030	-0.030



## Key findings

IPR use doubled  
in 15 years since  
2001-02

On average, IP  
owners are  
larger and more  
profitable than  
non-owners

Manufacturing  
and Wholesale  
Trade attract  
most IPR usage

IP rights  
increase profits  
for profitable  
businesses

IP businesses  
holding trade marks  
and other IP rights  
contribute more to  
business profitability

No conclusive  
evidence that IP  
rights affect  
market  
concentration





Australian Government

IP Australia

# Thank you!

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## System GMM of Model 1.1

Dependent variable: Log (profit per invested capital)		GMM	OLS	Fixed Effects
IPR owner		1.28***	-.07***	-.04*
Lags of log of profit on invested capital	Lag1	.51***	.58***	.15***
	Lag2	.13***	.16***	-.02***
	Lag3	.04***	.06***	-.05***
	Lag4	.02***	.04***	-.04***
	Lag5	.01**	.03***	-.04***
	Lag6	.006	.03***	-.04***



## System GMM of Model 1.1

Dependent variable: Log (profit per invested capital)	System GMM of Model 1.1	Dependent variable: Log (profit per employee)	System GMM of Model 1.1
IPR owner	1.28*** (2.56)	IPR owner	1.24*** (2.46)
Age of business	-.05***	Age of business	-.02***
No. of observations	468 017	No. of observations	328 583
No. of instruments/groups	35/138 027	No. of instruments/groups	35/96 834
Arellano-Bond test for AR(2)	.649	Arellano-Bond test for AR(2)	.356
Hansen test	.359	Hansen test	.106



## System GMM of Model 1.2

Dependent variable: Log (profit per invested capital)	System GMM of Model 1.2	Dependent variable: Log (profit per employee)	System GMM of Model 1.2
Patents only	1.19 (2.29)***	Patents only	1.19 (2.29)***
Trade marks only	1.39 (3.01)***	Trade marks only	1.16 (2.19)***
Designs only	0.43 (0.54)**	Designs only	0.58 (0.79)**
Patents and trade marks	2.14 (7.50)***	Patents and trade marks	1.76 (4.81)***
Patents and designs	0.66 (0.93)	Patents and designs	0.99 (1.69)**
Trade marks and designs	1.77 (4.87)***	Trade marks and designs	1.65 (4.21)***
All three IP rights	2.05 (6.77)***	All three IP rights	1.64 (4.16)***



## System GMM of Model 1.3

Dependent variable: Log (profit per invested capital)		System GMM	Dependent variable: Log (profit per employee)		System GMM
Log Stock of three types of IPRs per employee	patents per employee	-.30	Log Stock of three types of IPRs per employee	patents per employee	-.26
	trade marks per employee	.17		trade marks per employee	-.02
	designs per employee	-.21		designs per employee	.30
Lags of log of profit per invested capital	Lag1	.43***	Lags of log of profit per employee	Lag1	.53***
	Lag2	.21**		Lag2	.19**
Age of business		-.05**	Age of business		.01



## IV. IPR and Market Competition

### GMM of Model 2.2

Explanatory variables		Difference GMM	System GMM	OLS	Fixed effects
Log stock of the three different types of IPRs	patents per 1000 employees	.003	-.10	.01	-.10***
	trade marks per 1000 employee	-.22	-.04	.01	-.05
	designs per 1000 employee	.03	-.03	-.03**	-.001
Lags of log of HHI	Lag1	.59***	.68***	.75***	.48***
	Lag2	.10	.14	.19*	.016



## IV. IPRs and market competition

### GMM of Model 2.1

Explanatory variables		Difference GMM	System GMM	OLS	Fixed effects
<b>IPR-intensive industry dummies</b>	Patent-intensive industry dummy	-.01	-.06	-.01	-.06
	Trademark-intensive industry dummy	-.08	-.12	.02	.03
	Design-intensive industry dummy	-.06	-.19	-.09***	-.08
<b>Lags of log of HHI</b>	Lag1	.56***	.60***	.74***	.51***
	Lag2	.09	.10*	.20**	.05





# IV. IPR and Market Competition

## System GMM of Model 2.2

Explanatory variables		Difference GMM	Explanatory variables		System GMM
Log stock intensity of the three different types of IPRs	patents per 1 000 employees	.003	Log stock intensity of the three different types of IPRs	patents per 1 000 employees	-.10
	trade marks per 1 000 employees	-.22		trade marks per 1 000 employees	-.04
	designs per 1 000 employees	.03		designs per 1 000 employees	-.03
Lags of log of HHI	Lag1	.59***	Lags of log of HHI	Lag1	.68***
	Lag2	.10		Lag2	.14



# SUPPLEMENTARY: SYSTEM GMM OF MODEL 1.1

Dependent variable: Log (profit per invested capital)	System GMM of Model 1.1	Dependent variable: Log (profit per employee)	System GMM of Model 1.1
Number of observations	468 017	Number of observations	328 583
Number of instruments / groups	35/138 027	Number of instruments / groups	35/96 834
F statistics	2 327.84***	F statistics	1 586.99***
Arellano-Bond test for AR(2)	.649	Arellano-Bond test for AR(2)	.356
Hansen test of joint validity of instruments	.359	Hansen test of joint validity of instruments	.106



# SUPPLEMENTARY SYSTEM GMM OF MODEL 1.2

Dependent variable: Log (profit per invested capital)	System GMM of Model 1.2	Dependent variable: Log (profit per employee)	System GMM of Model 1.2
Number of observations	468 017	Number of observations	328 583
Number of instruments / groups	53/138 027	Number of instruments / groups	47/96 834
F statistics	1780.4***	F statistics	1339.70***
Arellano-Bond test for AR(2)	.623	Arellano-Bond test for AR(2)	.368
Hansen test of joint validity of instruments	.189	Hansen test of joint validity of instruments	.158



## System GMM vs. Difference GMM (Bond 2002)

1. Unbalanced panel data – system GMM
2. The pooled OLS sets upper-bound estimate for the lagged dependent variable, while the corresponding fixed effects estimate should be considered a lower-bound estimate.
3. If the difference GMM estimate obtained is close to or below the fixed effects estimate, this suggests that the former estimate is downward biased because of weak instrumentation and a system GMM estimator should be preferred instead.



# Research questions

- Economic impact of IPRs on Australian businesses?
- Is IPR ownership associated with higher business profitability?
- Impact of IPRs on market competition in Australia?
- Do IPRs reduce competition?