

# Gentex

*(title linked to corporate website)*

## Case Study

Economics 243, December 2018

Prof Smitka, Washington & Lee University



**SmartBeam**  
Photobit Equity Stake In 1998



**HomeLink**  
Licensed In 1999  
Acquired from JCI In 2013



**ITM**  
Partnership with Transcore In 2015



**Biometrics**  
Delta ID Partnership In 2016



**CMS**  
Co-development with Ambarella In 2016

# History

- 1974: started in Zeeland, Michigan
  - manufactured residential smoke detectors.
- 1982: auto-dimming electromechanical mirror
  - minimal market uptake
  - patents show founder also played around with helmets
- 1987: electrochromic autodimming mirror
  - EC technology known for 50 years
  - first successful commercialization
  - Battelle Institute assisted (cf. Xerox story)
- Sample electrochromic patent: [Patent #5928572](#)

# Partial list of Customers

– now also Boeing –

## **BMW**

- BMW
- Rolls Royce

## **Chrysler**

- Chrysler
- Dodge
- Jeep

## **Daimler**

- Mercedes-Benz

## **Fiat**

- Alfa Romeo
- Fiat
- Lancia
- Maserati

## **Fisker**

## **Ford**

- Ford
- Lincoln

## **Geely**

- Emgrand
- Volvo

## **General Motors**

- Buick
- Cadillac
- Chevrolet
- GMC
- Holden
- Opel

## **Honda**

- Acura
- Honda

## **Honai**

## **Hyundai**

- Hyundai
- Kia

## **Mazda**

## **Mitsubishi**

## **Nissan**

- Infiniti
- Nissan

## **PSA**

- Citroen
- Peugeot

## **Renault**

- Renault
- Samsung

## **SAIC**

- MG
- Roewe

## **Ssangyong**

## **Subaru**

## **Suzuki**

## **Tata**

- Jaguar
- Land Rover

## **Toyota**

- Lexus
- Toyota

## **Volkswagen**

- Audi
- Bentley
- SEAT
- Skoda
- Volkswagen

# Financial Performance

Select Data from Annual Reports

Year	2017	2015	2011	2010	2009	2005	2000	1995	1990	1985
Net Sales	\$1,795	\$1,544	\$1,023	\$816	\$544	\$623	\$297	\$116	\$21	\$9
Net income	\$407	\$318	\$165	\$138	\$64	\$62	\$70	\$19	\$1	\$1
% net sales	22.7%	20.6%	16.1%	16.9%	11.9%	10.0%	23.7%	16.9%	5.3%	6.3%
R&D	\$100	\$88	\$82	\$64	\$47	\$52	\$17	\$6	\$2	\$0.6
% net sales	5.55%	5.7%	8.0%	7.9%	8.6%	8.3%	5.7%	5.2%	8.0%	6.7%



Made money in 2009!!

# Gentex: Products

- Auto-dimming mirrors
  - Glare from headlights of cars annoying
  - Flip-switch prismatic mirrors cheap, but awkward
  - Can automate?
    - Sensors for light levels
    - Motor to drive prismatic mirror
  - Maybe, but no market acceptance

# Gentex: ECM

- A physical solution was awkward, so...
  - Patent from 1984 is [here](#) (filed in 1981)
- How about a chemical one? ...[1990 patent filed 1987](#)
  - Electrochromatic gel darkens with current
  - So sandwich gel between glass and the mirror
- Well received on GM luxury cars
  - Profitable for Gentex: [key subsequent patent 1992](#)
    - earlier patent “abandoned” (filed 1986, [here](#) for 1990)
  - Good uptake as a high-price option
    - but Gentex charged a moderate price
    - so very profitable for GM, too

# Goal

- Continuing (profitable!) dominant firm
  - secondary goal: growth
- How can Gentex achieve this?
  - Donnelly next door is a natural rival
  - News of Gentex's success can't be hidden, esp. in a small town!
    - Donnelly has at least one related patent: brothers do fight...a multi-year legal dispute
    - Donnelly does produce auto-dimming mirrors



# Generic Issues

- Auto customers are also small in number
- Potentially a bilateral monopoly
  - a firm with market power selling to a firm with market power
- Specific assets are the norm
  - Pricing is inevitably contentious
    - Both are at risk of hardball tactics
- Greed encourages entry
  - Donnelly was (still is!) just up the road

# Approaches

- Customers want multiple sourcing
  - Helped if there are contracting norms
  - Buttressed by a reputation for fair play
- Suppliers want multiple customers
  - Ditto
- Multimarket, multiperiod contract context
  - Makes hardball tactics less beneficial to both
  - But managing relationship still difficult
- Gentex of course wants to keep its monopoly...

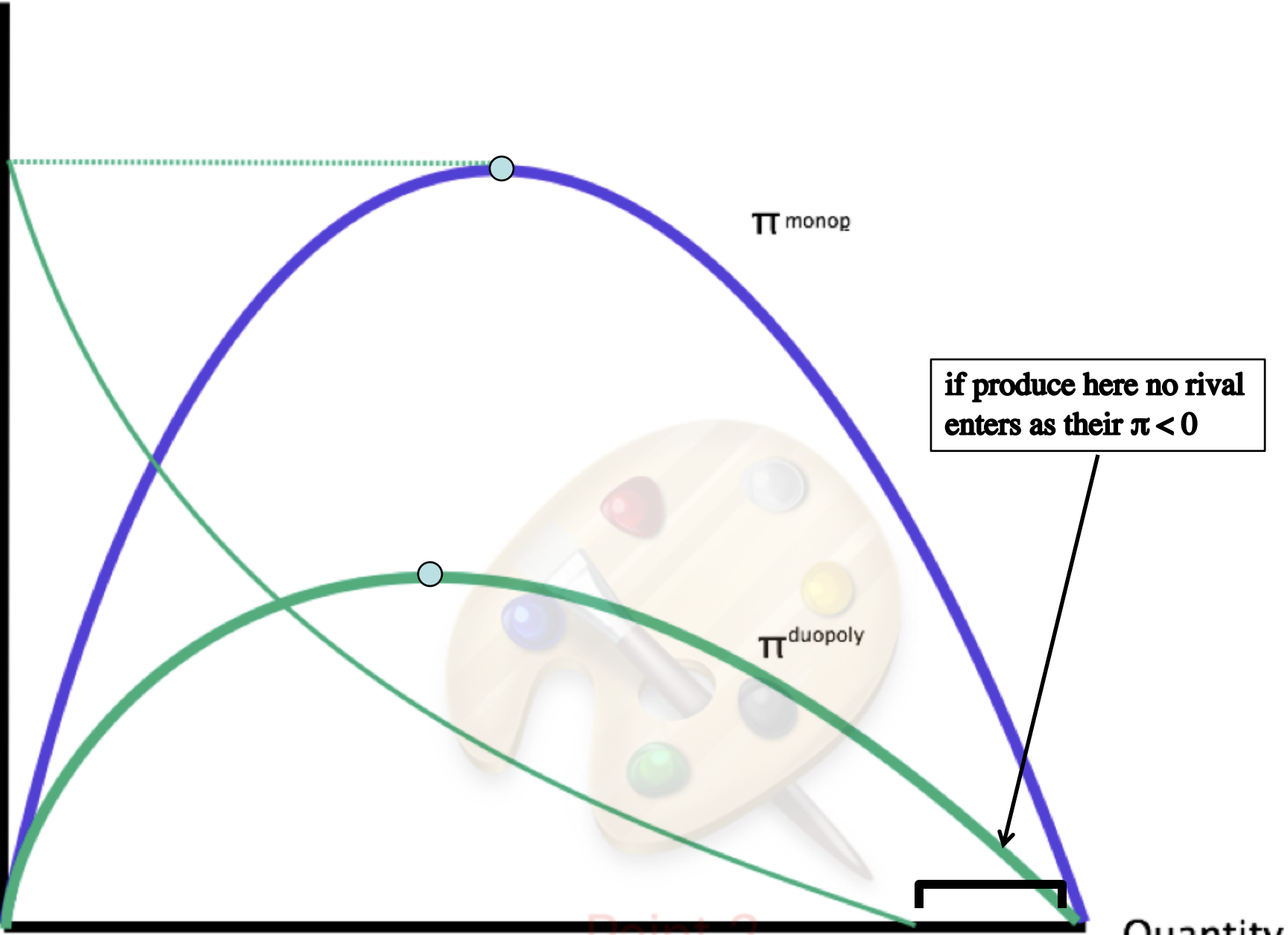
# Legal monopoly: patents

- a moving target, given rivals & new technologies
- constantly monitor competitors / tech literature
- Stream of subsidiary patents: as of 2017...
  - 581 US patents + 269 patents pending
    - 722 foreign patents + 304 patents pending
  - 36 US trademarks + 290 foreign

# Costs: learning curve

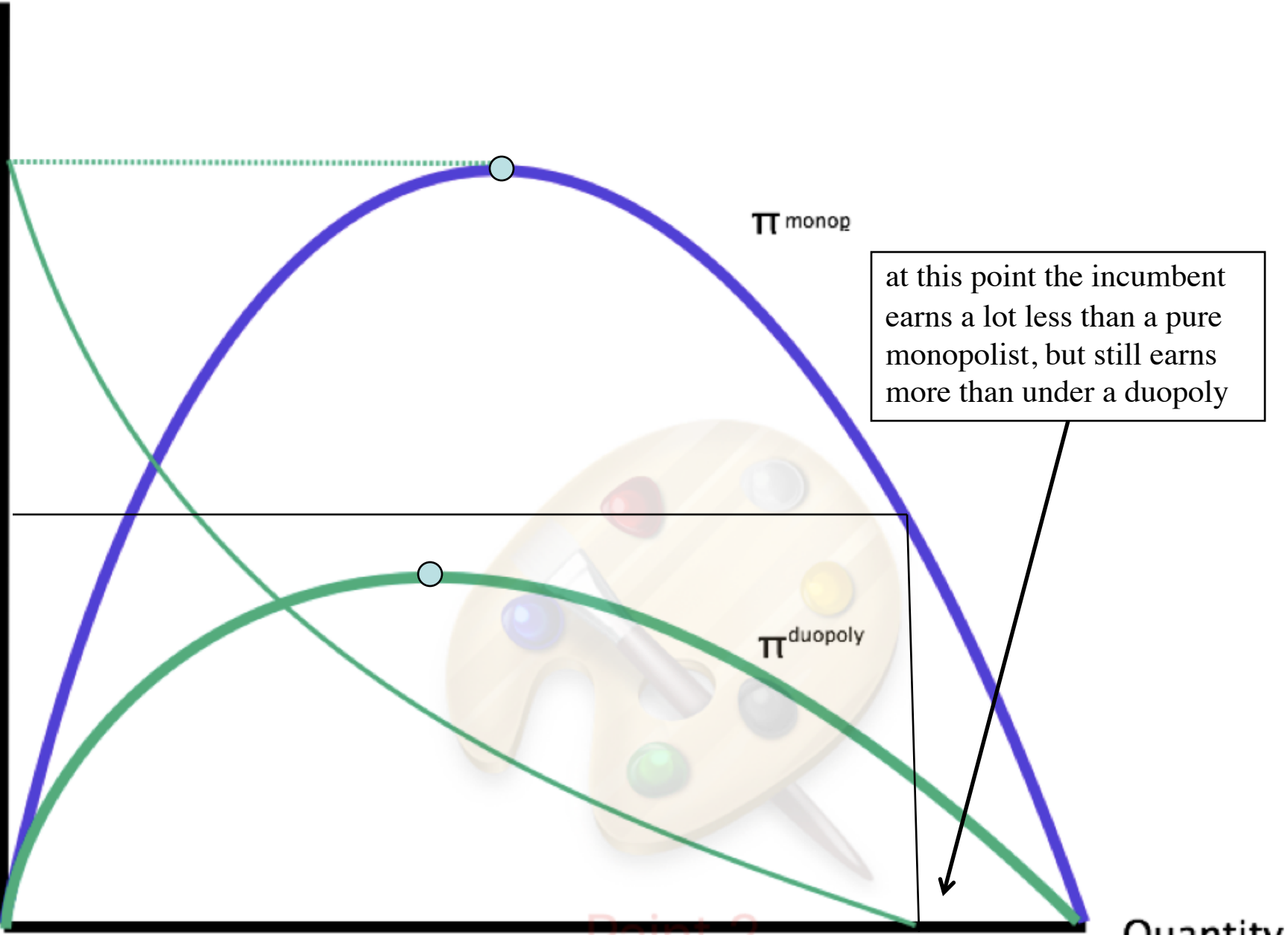
- if can lower, then
  - barrier to entry
  - in addition, gradually lowering prices
    - enlarges market
  - discourages entry
    - “Limit Pricing” model
  - see “experience curve” and “Boston Consulting Group” in Wikipedia

Profits  $\pi$



Paint 2

Profits  $\pi$



at this point the incumbent earns a lot less than a pure monopolist, but still earns more than under a duopoly

$\pi_{\text{monop}}$

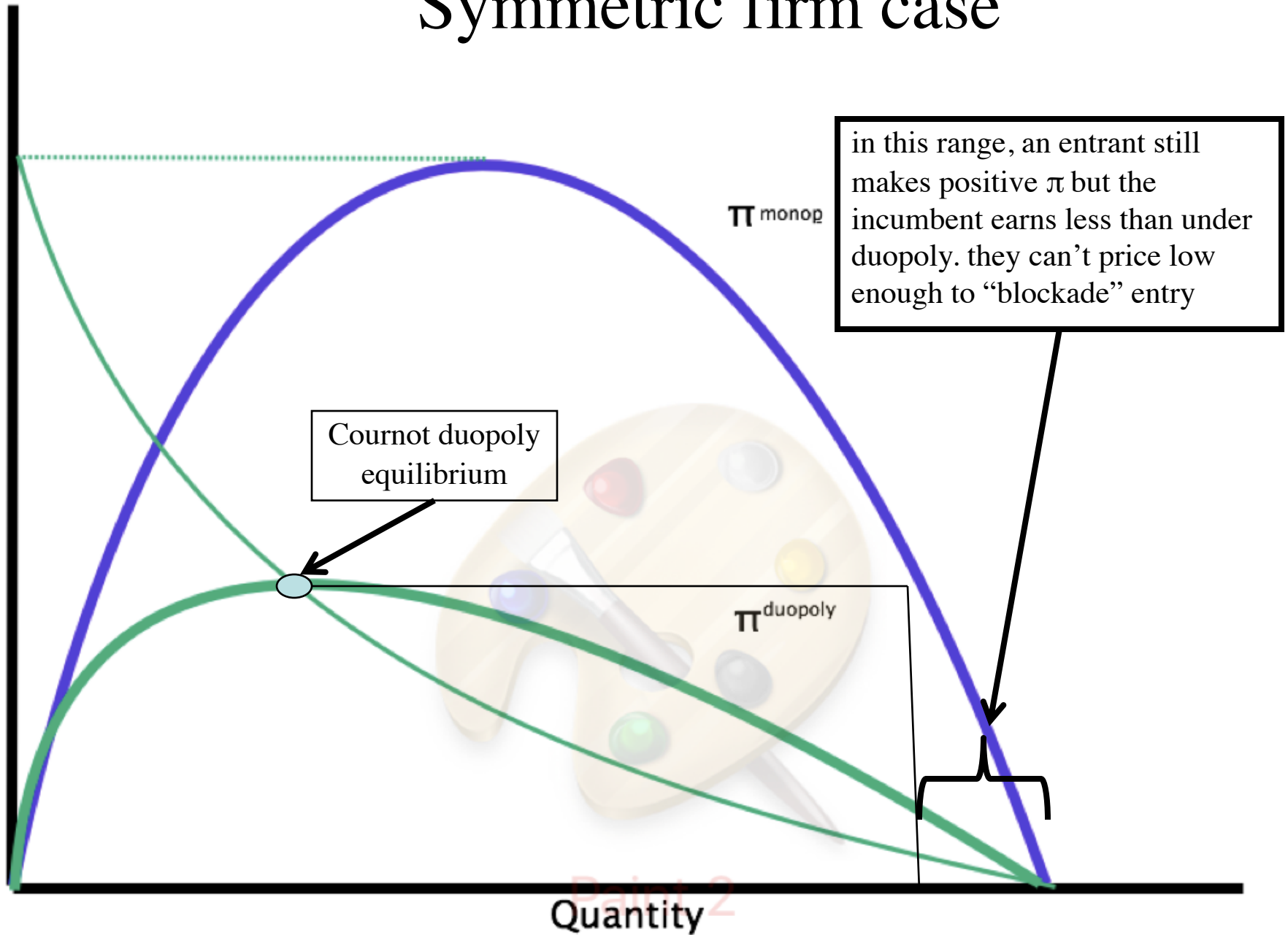
$\pi_{\text{dupoly}}$

Paint 2

Quantity

Profits  $\pi$

# Symmetric firm case



Back to Gentex



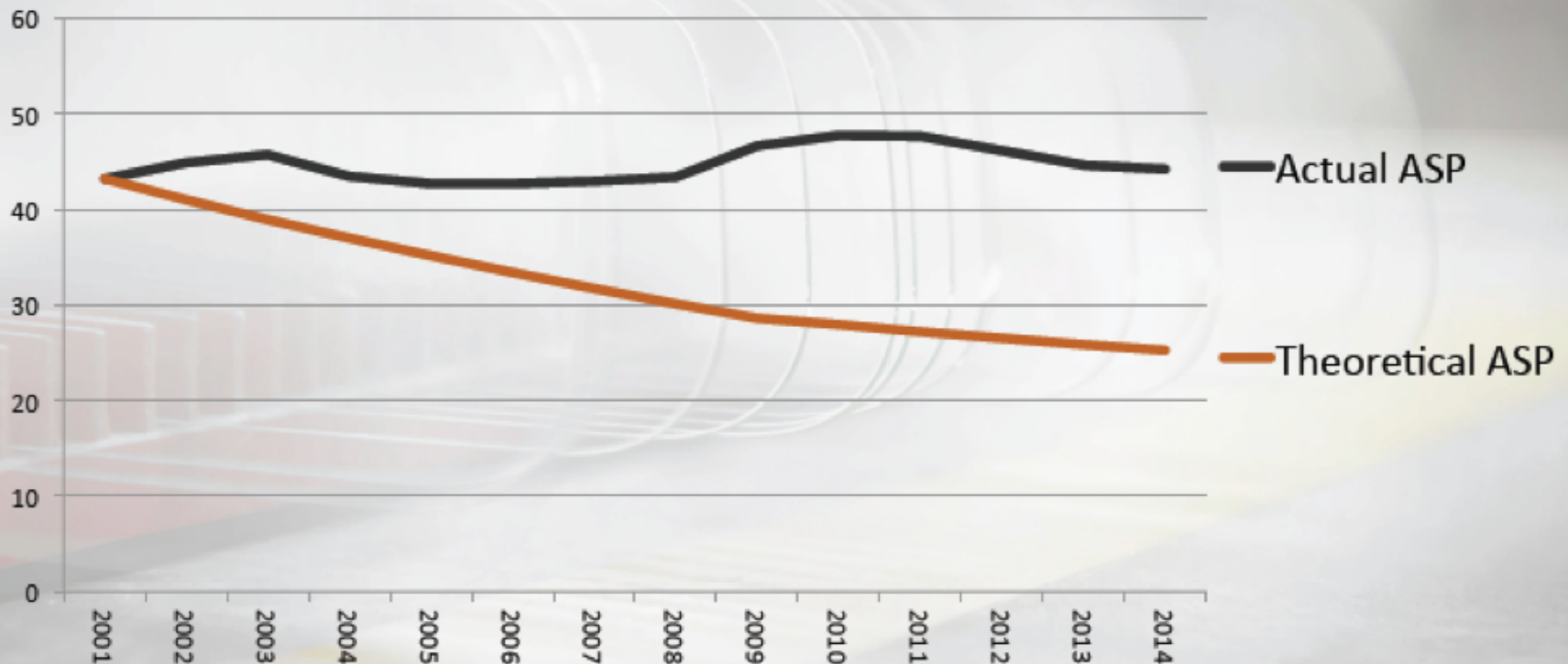
# Innovate in product complexity as an entry barrier

- Exterior mirror
  - 2- and 3-mirror sets
- Complicated glass
  - Thin, spherical and aspherical glass
- Additional features
  - integral compass & thermometer, backup camera display
  - keyless entry systems (Homelink™), map lights
- product differentiation / price discrimination / bundling
  - both high-end and low-end packages with different price points
  - complicated product makes harder for potential rivals
- Sensors, transceivers, displays, biometrics ...



# Annual Price Reductions and Content Growth

- If APRs continued at historical levels, without content growth ...
  - APRs would have dropped ASPs from mid 40's to the mid 20's
- Gentex maintains ASP through content growth
- Growing volumes opens up the door for more content growth



# Vertical structure

## “Tier I” vs “Tier II”

- how to sell?
  - via other mirror companies!!!
- lets focus on narrow R&D and production tasks
  - don't need plastics, paint & finish tech
  - all companies split their mirror “buy” among 2-3 firms
  - none buy 100% from a single firm
  - But Gentex can sell glass + circuit board to every mirror maker
  - and get 100% penetration
- Gentext gives a share of profits to mirror makers
  - potential competitors help market their mirror systems!

# Sum: Competitive Strategy

- don't be greedy!
  - Aggressively use learning curve
  - let other mirror makers make money
  - let auto companies make money
  - enlarges market, too

# Sum (II)

- make entry harder!
  - add features so “base” mirror no longer enough
  - raises technical hurdles to entry
    - learning curve
    - patents
  - improves margins, too!
    - OEMs expect regular price reductions
    - base mirror now quite

# Sum (III)

- Use Uncle Sam
  - Foster regulatory change
    - aspheric (outside) mirrors (US won't allow)
    - Lobby NHTSA that glare is a safety issue
  - Backup safety standards
    - you can put an LCD TV behind the mirror
    - frees up design of instrument panel

## **After 31 years**

- global market share: **90%**
- net income to sales: **> 20%**
- Debt: **none. zero. really!**
- Market penetration: **increasing**
- Unit volume: **increasing**
- Revenue: **\$1.8 billion company**
- R&D: **\$100 million**

# The Final Frontier

- Gentex is working to **eliminate** mirrors
- With camera + display
  - No blindspots, wider field-of-view
  - Better optical dynamics
    - Even night vision!!
- The Holy Grail: architectural glass
  - But not with current technology