

# Contracting for technology transfer: patents, know-how and IP bundles

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12-13 November 2013  
PSDM Conference  
Patent Statistics for Decision Makers  
Rio de Janeiro

# Technology Transfer

Main source of innovation in firms from developing countries

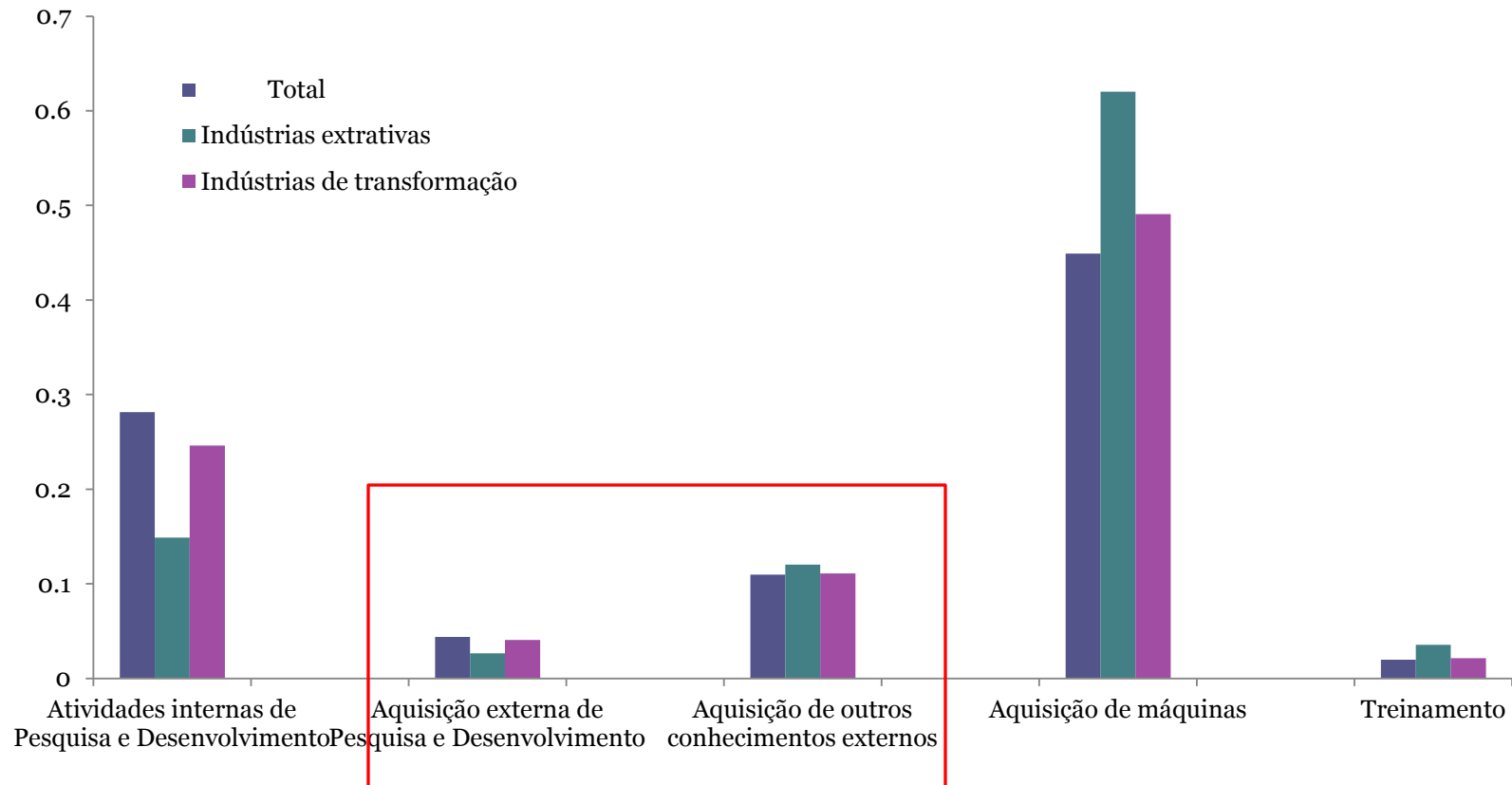
Formal technology transfer takes many forms:

- Machinery acquisition (technology imports)
- Technology licensing:
  - Intellectual property licensing
  - Know-how and Technical services
  - Training, etc.

In spite of its importance, formal technology licensing has been understudied empirically

- Data limitations

## Importance of external technology acquisition in total innovation expenditures in Brazil



Source: PINTEC Survey 2008

# Know-how

- **Tacit** knowledge, **non codifiable** (in blue-prints, designs and patents), non transferable without incurring into important **contractual hazards** (Polanyi 1966; Rosenberg 1983; Pavitt 1987), **not easily protectable** (trade secrets)
- Transfer not verifiable, **incomplete contracts** (Teece 1986; Macho-Stadler et al, 1996)
- **Contractual hazards:**
  - **Informational assymetries**
    - Double sided moral hazard issues
      - Licensee – will he pay after learning?
      - Licensor – will he provide the know-how required?
    - Adverse selection
      - Not a strong issue if technology proven in origin country?
  - **Risk-sharing**
    - Uncertainty about profitability (e.g. downstream reneveues)

# Literature on know-how provision

## Means to alleviate contractual hazards

- **Bundling**
  - Complementary assets (know-how not alone but related to the provision of other technology inputs)
  - Particularly, patents reduce opportunistic risk and therefore facilitate know how provision (Arora, 1995, 1996)
- **Contract length**
  - Contract duration to mitigate moral hazard. Mendi (2007: shorter contracts with know how alone but longer when complementary technical services)
- **Payment Schemes**
  - More tacit (uncodified) knowledge transfer related to fixed payments while codified related to royalty rates (Bessy et al, 2010, Cebrian, 2009)
  - Moral hazard on the side of the licensor more prone to royalties, on the side of the licensee to up front payments (Macho-Stadler et al 1996, Cebrian 2009, Hedge 2013)

## **Our RESEARCH interest in this study: Transfer of know-how in patent licensing contracts**

**We investigate under what contractual, sectoral and technological conditions know-how is included in patent licensing agreements**

Patents reduce informational asymmetries and lower transaction costs.

But licensees not only need rights to use those licensed technologies which are protected with IPRs, they need access to the know-how needed to implement all licensed technologies

How different are technology contracts with patent licensing & transfer of know-how from contracts with patent licensing only?

- IP bundles
- Payment schemes
- Exclusivity restrictions
- Technology features

### **DATA SOURCE**

Technology Contract registration in Brazil, 1996-2012

Instituto Nacional da Propriedade Industrial. Base de Dados de Contratos de Tecnologia

# TECHNOLOGY CONTRACTS in Brazil

**According to Brazilian law (art. 211 of the Industrial property law 9279/1996), the registration of licensing agreements and those involving technology transfer before the INPI is mandatory for the following purposes:**

- opposability against third parties
- deduction by the Brazilian party of the amounts paid to the foreign party for income tax purposes (registration with the Central Bank of Brazil is also required)
- remittance of payments abroad (registration with the Central Bank of Brazil is also required)
- creation of a presumption of non violation of the economic order, since the INPI is considered an auxiliary agency of the economic authorities.

# DATA: technology contracts with patent licensing

**The INPI registers five types of agreements and combinations of them:**

EP (patents, industrial design rights, utility models), UM (trademarks),  
FRANQUIA, FT, SAT

**Our focus in this study is EP + EP COMBINED (around 5% of all) = 660**

We consider that contracts with patent licensing and transfer of know-how are those classified as EP with FT and/or SAT, the registration of FT or SAT independently indicates the importance given to transfer of know-how by the parties

**INPI technology contract data allow us to identify:**

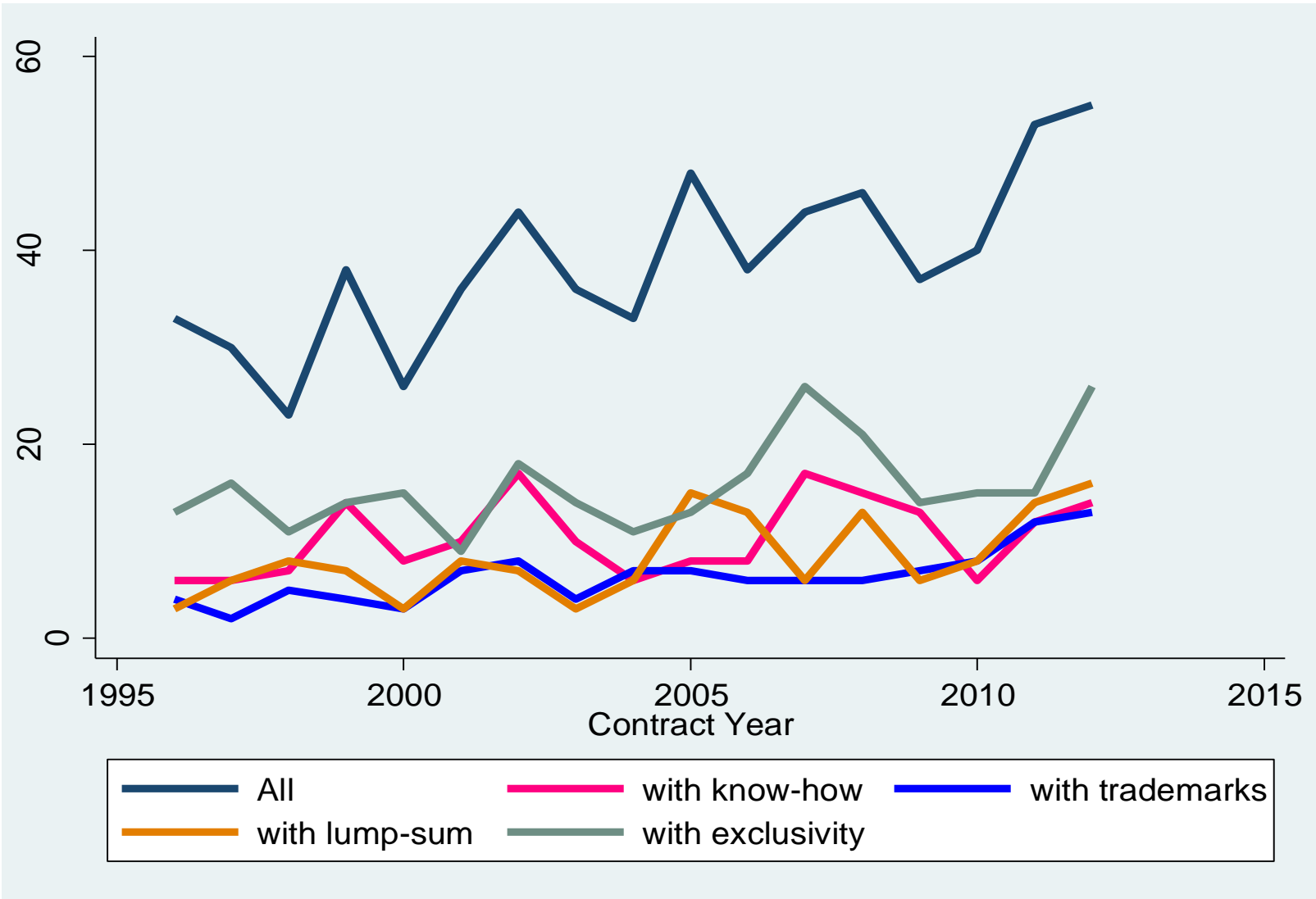
- Country of origin of licensor and licensee
- Economic sector of licensee
- IPRs licensed, type of agreement, exclusivity, payment scheme

**We link patent numbers mentioned in the contracts to PATSTAT October 2012 and get a final sample of 556 contracts with patent information**

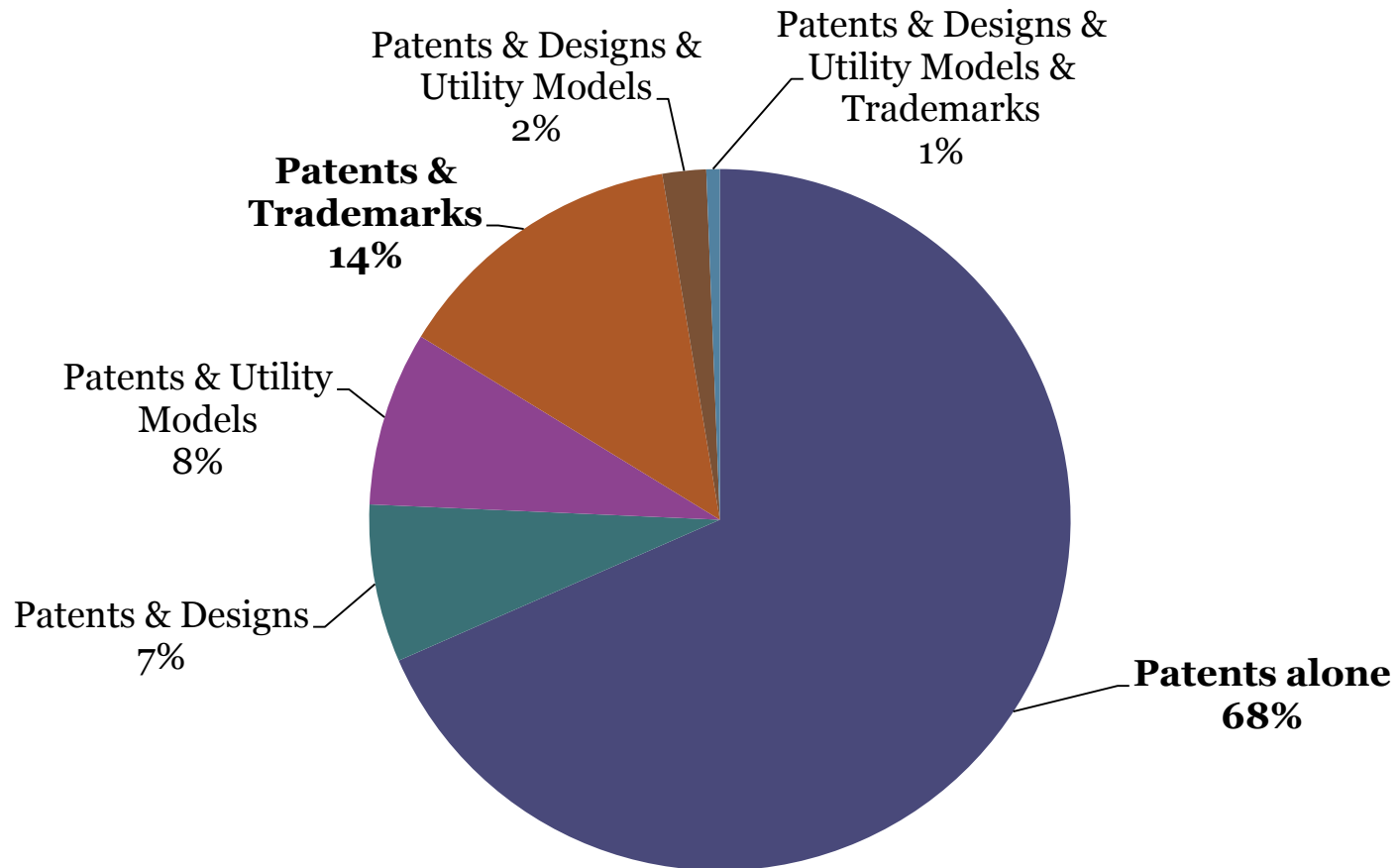
- Cost of patented invention (number of inventors)
- Scope (number of different IPC classes)
- Diffusion lag (number of years between patent filing and registration of contract)



# TRENDS: technology contracts with patent licensing

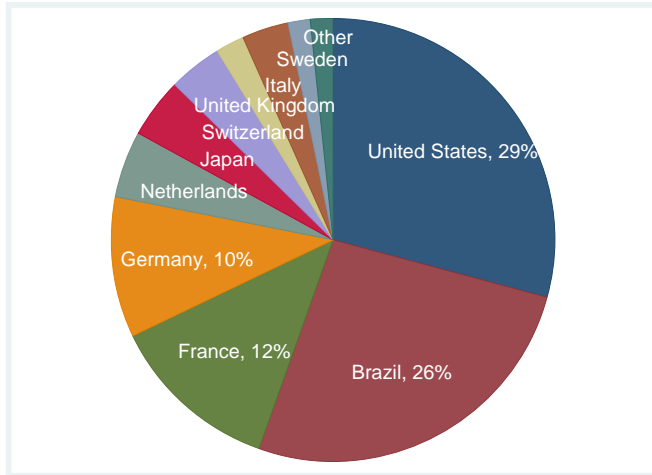


# IPR BUNDLES with patent licensing

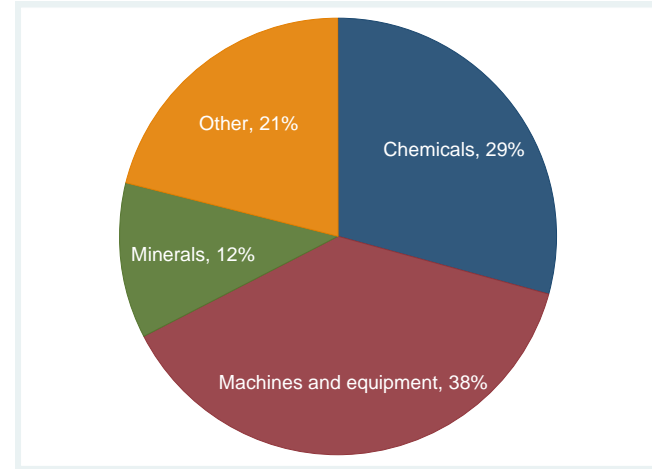


# PATENT LICENSING

## by countries

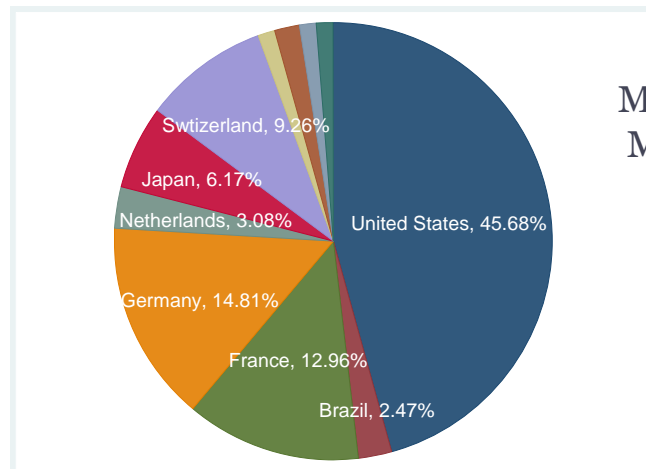


## by sectors



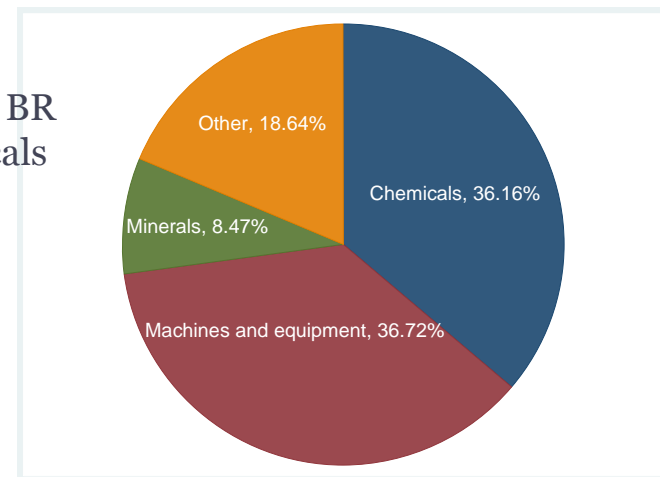
# PATENT LICENSING with KNOW-HOW

## by countries



More US, less BR  
More Chemicals

## by sectors



## FEATURES of patent licensing contracts

	All	With know-how	Without know-how	Diff.	Sig.
Know-how	27%				
Affiliated	44%	<b>60%</b>	38%	+	***
Exclusivity	41%	34%	<b>43%</b>	-	*
Lump-sum	22%	<b>28%</b>	19%	+	**
Patents in IP bundle (with designs/utility models/trademarks)	33%	<b>34%</b>	<b>33%</b>		
Patents & Trademarks	17%	<b>28%</b>	12%	+	***
Average nbr patents	11	<b>17</b>	9	+	**
<b>All</b>	<b>660</b>	<b>177</b>	<b>483</b>		

## Provision of know-how with patent licensing

Probit: marginal effects

	Not Affiliated	Not affiliated & foreign
<b>Technology features</b>		
Triadic	-0.110 (0.068)	-0.121 (0.099)
IPC4 nbr (log)	0.038 (0.076)	0.051 (0.108)
Inventors nbr (log)	<b>0.156**</b> (0.068)	0.059 (0.109)
Diffusion lag (log)	-0.064 (0.045)	-0.082 (0.066)
<b>IP bundle:</b>		
Patents nbr (log)	-0.025 (0.032)	-0.024 (0.046)
Utility models	0.117 (0.225)	0.194 (0.304)
Trademarks	<b>0.238***</b> (0.099)	<b>0.289***</b> (0.106)

**KN more likely with TM and LS**

<b>Contract features:</b>		
Exclusive	-0.048 (0.052)	-0.106 (0.075)
Lump-sum	<b>0.172***</b> (0.061)	<b>0.201***</b> (0.073)
<b>Country of licensor:</b>		
Germany	<b>0.273**</b> (0.133)	<b>0.327**</b> (0.136)
United States	<b>0.210***</b> (0.086)	<b>0.259***</b> (0.094)
France	<b>-0.130**</b> (0.049)	<b>-0.198**</b> (0.082)
Brazil	<b>-0.210***</b> (0.050)	
<b>Sector of licensee:</b>		
Chemicals	<b>0.158**</b> (0.076)	<b>0.264***</b> (0.102)
Pseudo R-sq	0.266	0.194
Log Likelihood	-110.4569	-99.78472
N	280	202

## Joint incidence of contractual features in patent licensing

Multivariate probit: only rho coefficients reported

	Not aff.	Not aff. & foreign
rho(Know-how, Trademarks)	<b>0.456***</b>	<b>0.458***</b>
	(0.116)	(0.122)
rho (Know-how, Exclusivity)	-0.045	-0.170
	(0.107)	(0.113)
rho (Know-how, Lump-sum)	<b>0.304***</b>	<b>0.399***</b>
	(0.096)	(0.096)
rho (Exclusivity, Trademarks)	-0.078	<b>-0.229*</b>
	(0.122)	(0.139)
rho (Lump-sum, Trademarks)	0.182	0.089
	(0.120)	(0.137)
rho (Lump-sum, Exclusivity)	<b>-0.224**</b>	-0.171
	(0.098)	(0.121)
Log likelihood	-510.956	-409.591
N	290	204

**Complementarity  
of KN and TM**

Similar approach as in  
Anand and Khanna (2000)

p<0.10, \*\* p<0.05, \*\*\* p<0.01. Standard errors in parentheses. Same independent variables and controls as in previous probits. Dependent variables in mvprobit are know-how, exclusivity, lump-sum and trademarks. Rhos are significantly different from zero.

# Conclusions

## **Our analysis provides new evidence on the design of patent licensing contracts, for a developing country with fast growth and learning**

- Results confirm that patent licensing with know-how has particular contract and technology features (trademarks, payment schemes, sectoral differences, cost of invention)
- Further research needed...

## **Findings relevant for innovation and IPR policy**

- Innovation and spillovers in host country should focus on technology packages, not stand-alone patents
- Firms tend to protect transfer of know-how in patent licensing with contractual features (e.g. payment schemes) and protect different dimensions of same technology with different IPRs (Helmers and Schautschick 2013)
- Monitoring sales and quality to maximise revenues downstream may be facilitated by licensing trademark use when know-how is provided with patent licensing
- Quality of all IPRs matters, not only quality of patents
- Link of trademarks with innovation

# Thanks

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