Reallocation and Productivity Growth

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- Presentation based on joint work with:
  - Stefano Scarpetta
  - Fabiano Schivardi
  - John Halitwanger
  - and depends on work of many others…..
    - Mika Maliranta, Satu Nurmi, Jonathan Haskell, Richard Duhaitois, Pedro Portugal, Thorsten Schank, Ralf Marten, Ylva Heden, Ellen Hogenboom, Mihail Hazans, Jaan Masso, John Earle, Milan Vodopovec, Maurice Kugler, John Roberts...
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Overview

➢ **Productivity Framework**

    ➢ **Defining Experimentation**

➢ **Data Collection**

➢ **Storyline in tables and charts**

    ➢ **Productivity Dispersion**

        ➢ **High tail of distribution**

        ➢ **Role of resource allocation**

    ➢ **Entry and Exit**

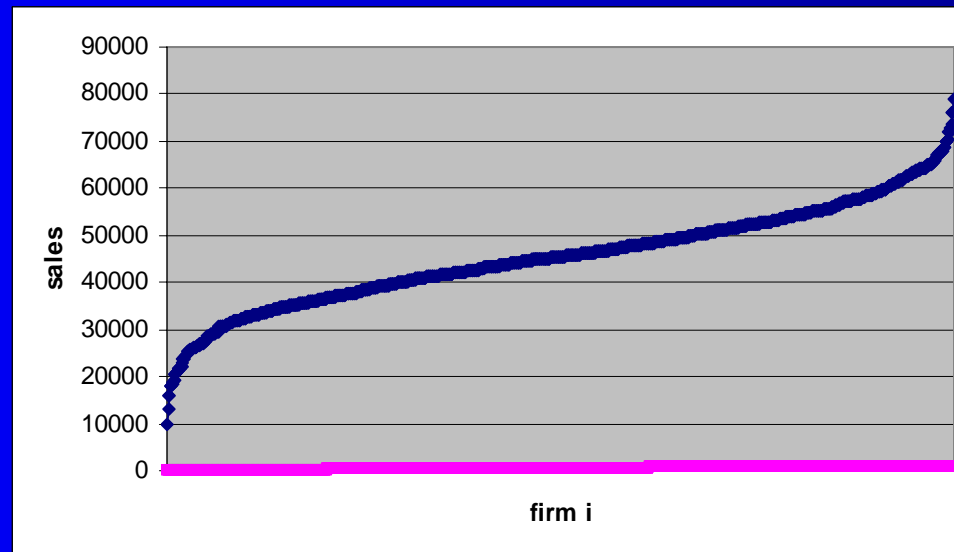   ➢ **Entrant size, dispersion, and post-entry growth**

Framework

- **Productivity Levels**
  - **Dispersion across firms**
  - **Allocation among continuers, entry/exit**
- **Productivity Growth**
  - **Transitional growth through reallocation**
  - **Improving within-firm productivity**
  - **Pushing out the frontier: Innovation/Experimentation**
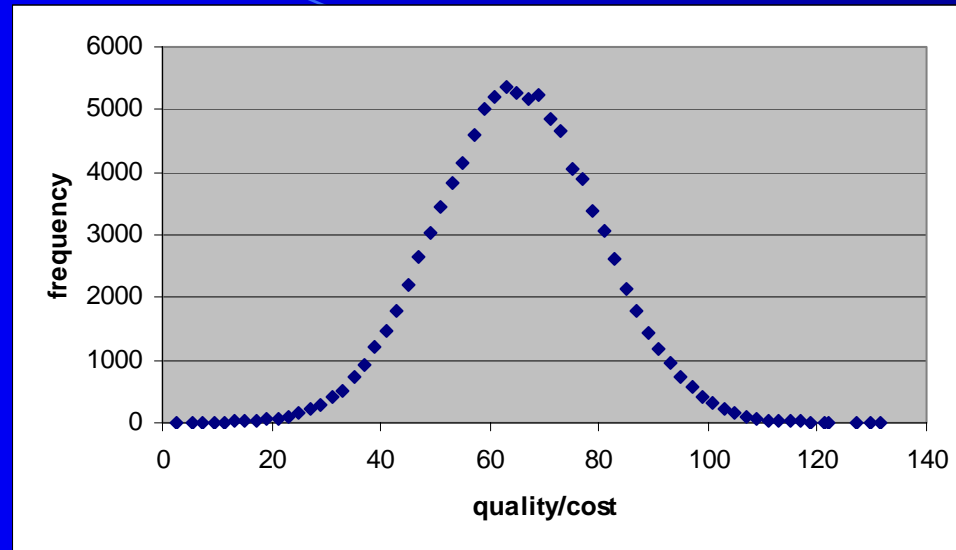
Benefits of investment depend not only on technological outcome, but also on future sales increases.
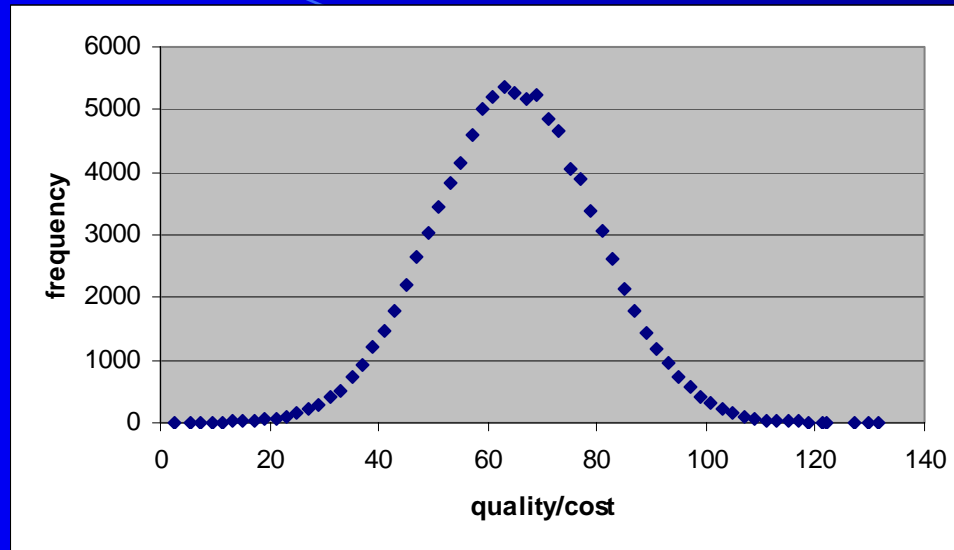
Framework

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Experimentation

● Expenditures leading to a 'stock' that provides as a flow: newer/better/cheaper ways to meet demand.

– Is this different from product and process R&D?

– Is this different from adopting newest technology embodied in capital?

● Two relevant characteristics:

– uncertainty in path from expenditure to stock growth.

– Rival nature of service flows coming from stock

● Experimentation yields stock generating non-rival service, but also requires complementary rival stocks.

Traditional View

	Uncertainty	
	Low	**High**
Rival	Tangible Investment	
Non-Rival		Intangible Inv. e.g. R&D

Experimentation

	Uncertainty	
	Low	**High**
Rival	Tangible Inv. R&D (markets for inputs and technology licences for outputs)	Experimentation: Uncertainty of market response. Non-rival outcome. Leveraged through rival assets
Non-Rival		

Experimentation

- **Flexibility in scale encourages experimentation**

- **Market 'responsiveness' encourages experimentation**

- **Areas where technological advance includes uncertainty in market response require experimentation**

ICT Investment requires Market Experimentation

- **Quality/cost improvement not observable in 'laboratory'**
  - it takes a dog to test the dog food
- **Investment recouped by quality/cost improvement times volume increase**
- **Volume increase requires resource reallocation**

Market Experimentation

- **What should we observe?**
  - Wide dispersion in firm performance
  - Rapid reallocation to best firms
  - Effective market selection (entry/exit)
- **Data sources**
  - international collaboration
  - distributed micro data analysis

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➢ *Data Collection*

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  ➢ **Productivity Dispersion**

    ➢ **High tail of distribution**

    ➢ **Role of resource allocation**

  ➢ **Entry and Exit**

    ➢ **Entrant size, dispersion, and post-entry growth**

Reasons for data collection

- **Policy question:** are there differences in firm dynamics across countries that can contribute to explain the different pace of innovation. Recent growth trends suggest <u>widening growth disparities</u> between EU and US

- **Problem:** firm-level data are not readily available for different countries …

  … and existing micro studies do not allow for meaningful cross-country comparisons, because of differences in: i) underlying data; ii) methodologies; iii) sectoral and time coverage etc.

- Hence, need for assembling *micro data trying to minimise country differences*.

Distributed micro-data collection

- **EU Sample (10 countries)**
  - **Productivity decompositions**
  - **Sample Stats and correlations by quartile**
- **World Bank sample (10-15 countries CEU/LA/SEA)**
  - **Demographics (entry/exit) and survival**
  - **Productivity decompositions**
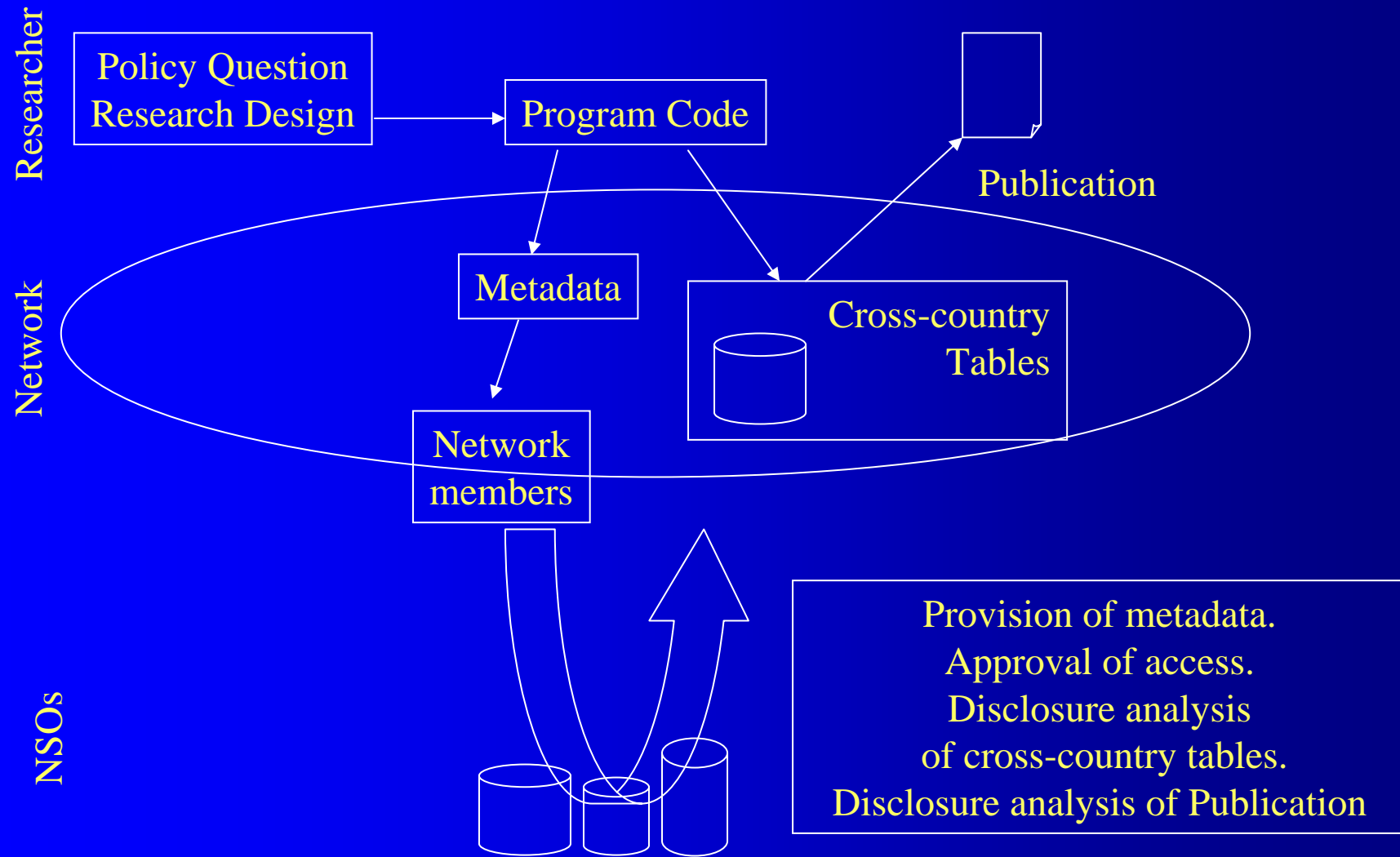- **OECD Sample (7-10 countries)**
  - **Same variables**

Data sources

● **Business registers for firm demographics**

    – **Firm level, at least one employee, 2-digit industry**

● **Production Stats, enterprise surveys for productivity analysis**

Distributed micro data research

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Weighted/Unweighted Productivity
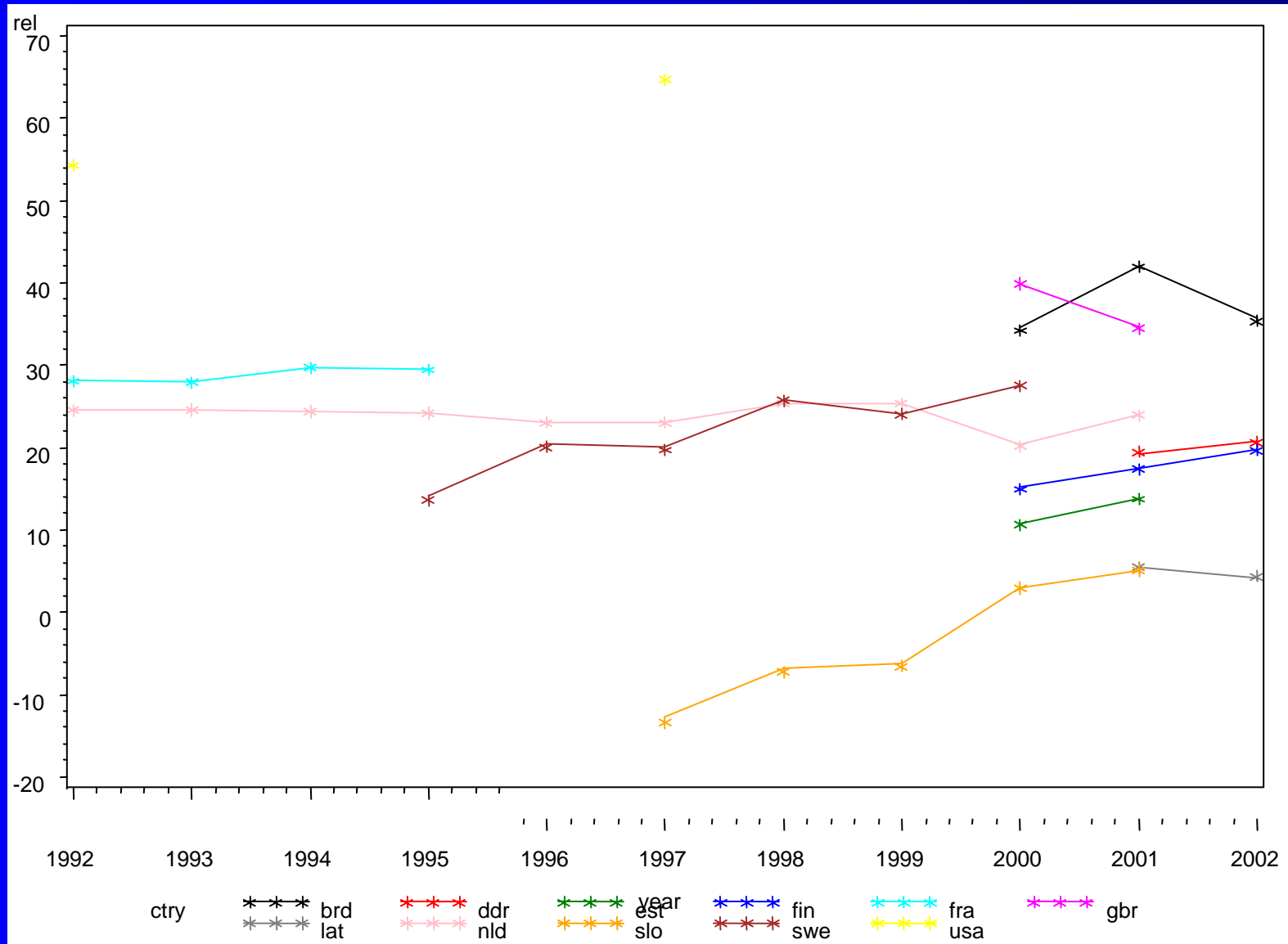
Weighted/Unweighted Productivity

Dynamic Reallocation

Manufacturing

Employment Growth vs. Labor Productivity (1000$)

Legend: ctry — brd, est, gbr, nld, slo, swe
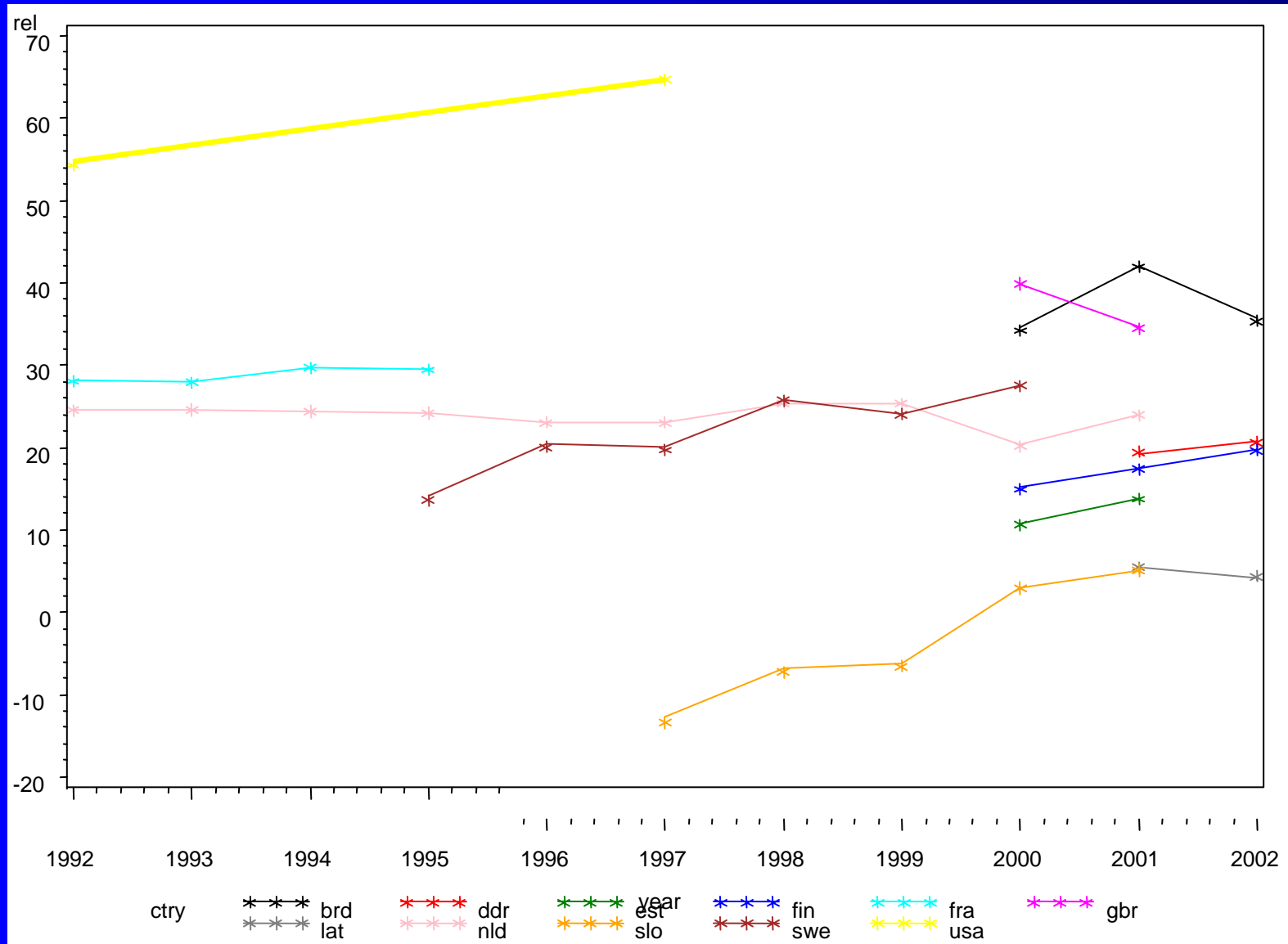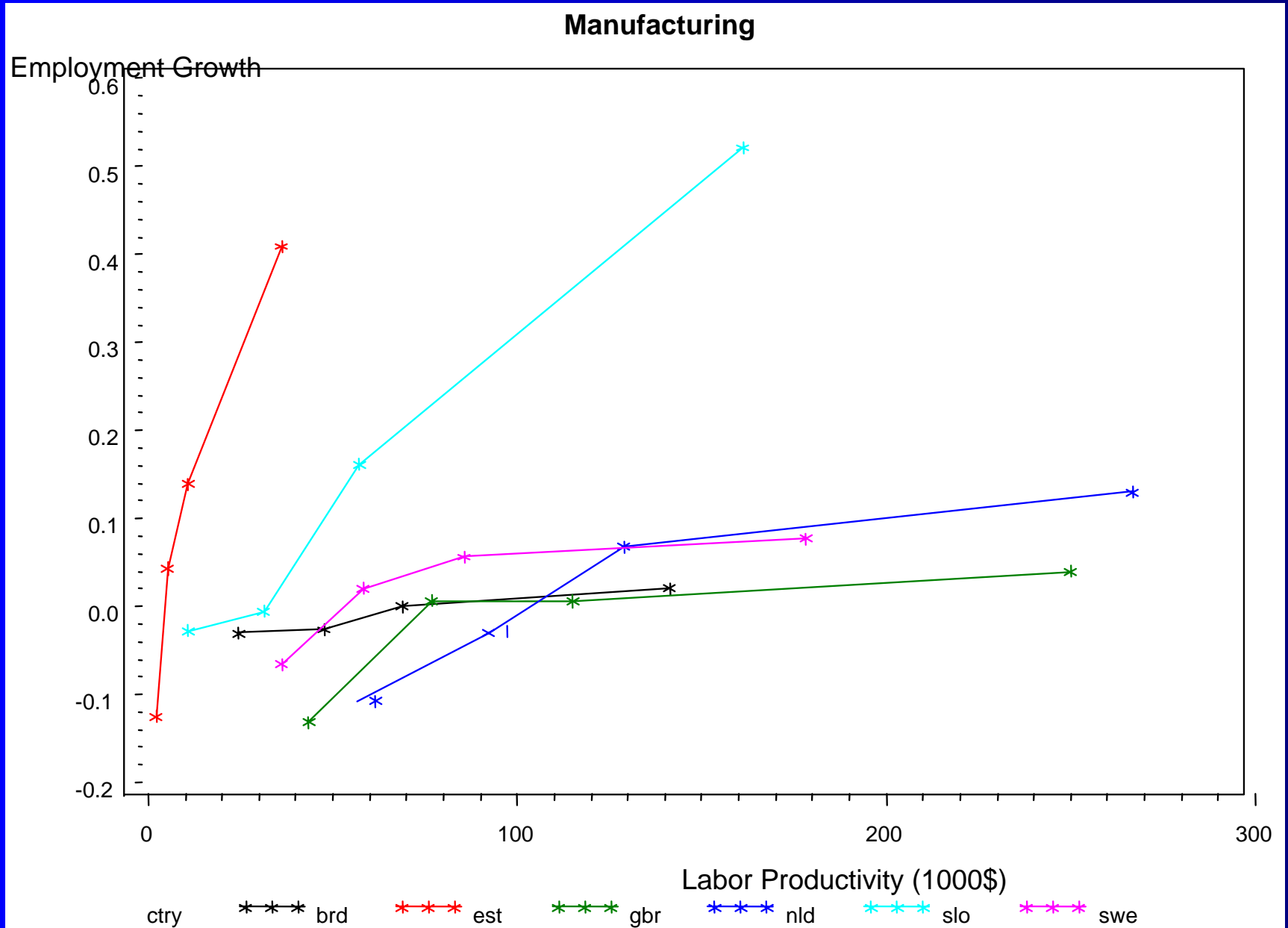
Relative Productivity: Top Quartile to mean

regressed on country and industry dummies

	LPQ	LPV	TFP	MFP
FIN[*]	2.27	1.98	1.20	1.21
	(.017)	(.009)	(.007)	(.003)
FRA	2.10	1.70	1.59	
	(.030)	(.017)	(.014)	
GBR	2.09	1.88	1.75	1.32
	(.022)	(.012)	(.010)	(.004)
ITA			1.79	
			(.008)	
NLD	2.04	1.64	1.56	1.22
	(.021)	(.012)	(.009)	(.004)
USA	2.33	2.19	2.13	1.58
	(.043)	(.024)	(.020)	(.009)

Note: standard errors in parentheses. *TPF and MFP are log of mean level for quartiles in Finland. Means of log level elsewhere.

Labour Productivity Dispersion

Quartile	ICT-producing		ICT-using	
	US	EU	US	EU
Top	123	118	74	58
3	88	87	51	48
2	61	72	40	46
Bottom	38	68	26	41

Units: Thousand US$ per worker

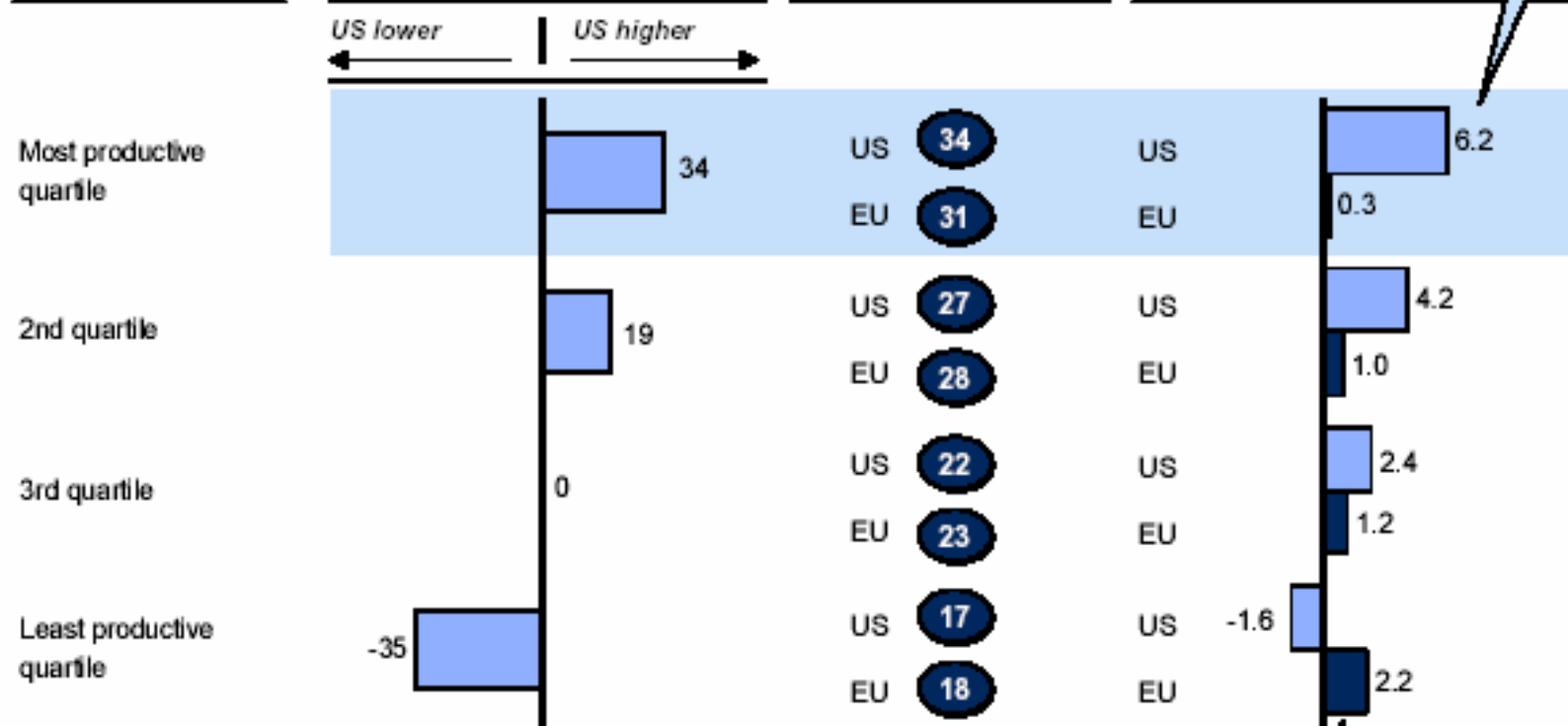# THE US IS BETTER AT ACHIEVING EXCELLENT PRODUCTIVITY AND REALLOCATING RESOURCES TO MOST PRODUCTIVE COMPANIES

2000

Companies' quartile[1]	US vs. EU[2] productivity Percent	Share in employment[3] Percent	Employment growth[4] Percent
Most productive quartile	34	US 34 / EU 31	US 6.2 / EU 0.3
2nd quartile	19	US 27 / EU 28	US 4.2 / EU 1.0
3rd quartile	0	US 22 / EU 23	US 2.4 / EU 1.2
Least productive quartile	-35	US 17 / EU 18	US -1.6 / EU 2.2

US lower ← | → US higher

Top US companies grow faster than top EU companies

The US eliminates its least productive companies; the EU does not

1) Aggregated data for manufacturing sector, STAN 15t37
2) Weighted average of EU countries for which data were available; Finland, France, United Kingdom, the Netherlands and Sweden
3) Average share 1995-2000
4) Average annual growth in resources, 1995-2000
Source: ESI-VU

Incentives for firm-level productivity growth

- **The relationship between variability in market share of firms in an industry and productivity growth of the industry.**
  - Market share turbulance: the mean output growth of the fastest growing quartile of firms minus the mean output growth of the slowest growing quartile of firms in an industry;
  - Productivity growth: either LPQ, LPV
- **A regression of productivity growth in most disaggregated industries, for countries and years, on market share turbulance. Industry of country dummies included in regressions.**

Productivity Growth and Reallocation
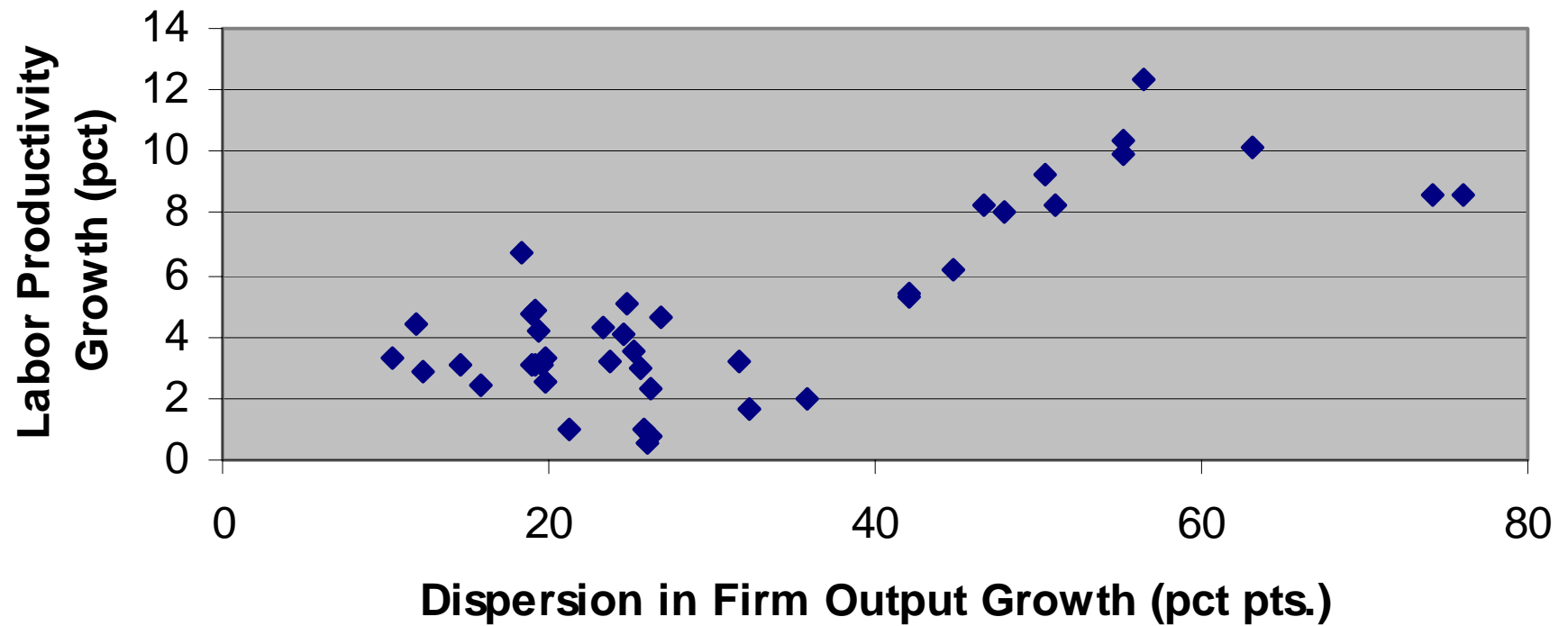
Effect of turbulence on incumbent productivity growth

Unweighted avg incumbents productivity growth regressed on:

'turbulence': interquartile range of cross-sect distribution of output growth

	LPQ			LPV		
Turbulance in market share	.14	.13	.11	.13	.12	.08
t-stat	(14.0)	(12.1)	(5.4)	(8.)	(7.2)	(3.0)
Dummies	-	Industry	Country	-	Industry	Country
R-sq	.21	.27	.29	.12	.19	.25
# obs	712	712	712	455	455	455

Reallocation and Growth

Within firm growth (y-axis)

Net entry contribution (x-axis)
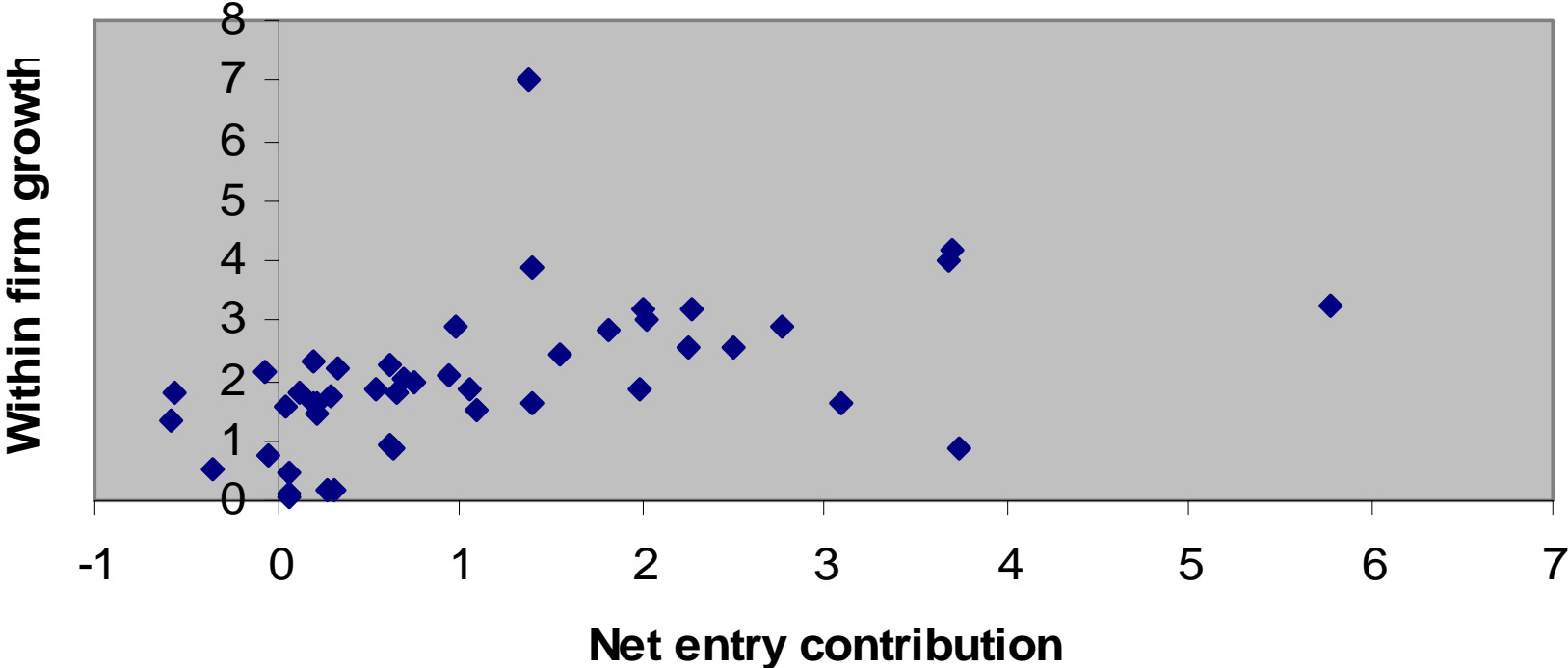
Indirect effect of net-entry to incumbent productivity growth (OECD)

Productivity growth of incumbents regressed on net-entry contribution

	GR				FHK			
	LPQ	**LPV**	**MFP**	**TFP**	**LPQ**	**LPV**	**MFP**	**TFP**
Const	0.14	0.18	-0.02	0.12	0.14	0.18	-0.02	0.12
	(4.46)	(3.87)	(1.07)	(2.71)	(4.50)	(3.96)	(1.14)	(2.75)
NE	0.54	1.00	0.96	0.74	0.53	1.06	0.94	0.87
	(7.83)	(10.29)	(8.01)	(6.88)	(7.75)	(11.03)	(7.66)	(7.74)
R_sq	0.38	0.32	0.41	0.22	0.38	0.33	0.40	0.24
nobs	515	515	451	703	515	515	451	703

note: industry & country dummies included; countries vary per regression; t-stat in parenthesis

Experimentation among entrants

- **Productivity dispersion of entrants in US is much higher than in EU**

- **Entrants in US are smaller than in EU**

- **Death rate of entrants a bit higher in US**

- **Growth of survivors is *much* larger in US**

Experimentation among entrants

Coefficient of variation of entrant productivity: country effects

	LPQ	LPV	TFP	MFP
FIN*	.106	.117	.156	.176
	(.001)	(.001)	(.004)	(.003)
FRA	.095	.099	.175	
	(.002)	(.003)	(.007)	
GBR	.055	.061	.095	.084
	(.002)	(.002)	(.005)	(.003)
ITA			.279	
			(.004)	
NLD	.099	.102	.189	.115
	(.001)	(.002)	(.004)	(.003)
USA	**.139**	**.175**	**.352**	**.247**
	(.003)	(.004)	(.010)	(.007)

Note: standard errors in parentheses. *TPF and MFP distribution in levels in Finland. In log-level elsewhere.

Experimentation among entrants, interacted with technology groups

Coefficient of variation of entrant productivity: country X technology effects

	LPQ	LPV	TFP	MFP
FIN[*]	.009	.004	-.004	.005
	(.003)	(.003)	(.010)	(.006)
FRA	.003	-.001	-.008	.006
	(.005)	(.006)	(.018)	(.010)
GBR	.006	.002	-.005	.005
	(.004)	(.004)	(.013)	(.008)
ITA			.014	
			(.011)	
NLD	.015	.006	.008	.028
	(.003)	(.004)	(.011)	(.007)
USA	.019	.017	.065	.049
	(.008)	(.009)	(.026)	(.015)

Note: standard errors in parentheses. *TPF and MFP distribution in levels in Finland. In log-level elsewhere.

Growth of Survivors
relative to size at entry