

**International services outsourcing and innovation:
An empirical investigation**

Holger Görg

GEP, University of Nottingham and CEPR

Aoife Hanley

University of Nottingham

Motivation (1)

- Fear of services outsourcing in public debate
- Economic analysis
 - ◆ Scale of services outsourcing small (e.g. Amiti and Wei (2006))
 - ◆ But transport & telecom now cheaper (Gage and Leshner, 2005)
 - ◆ Labour market effects
- Benefit of outsourcing: economic restructuring?
- Theoretically straightforward, but limited evidence

Motivation (2)

- Costs fuel services outsourcing growth
- Hourly computer programming rates
 - ◆ €54 Germany
 - ◆ €44 US
 - ◆ €9.24 Russia
 - ◆ €14 Portugal and China
 - ◆ €7 India



Our research question

- We empirically analyse the link between international services outsourcing and innovation
- Use establishment level data for Republic of Ireland
- Data cover manufacturing and services sectors
- Recent time period: 2000 - 2004

Background

- Empirical work on outsourcing mainly for manufacturing, aggregate data, and labour market issues (Feenstra and Hanson, 1999; Head and Ries, 2002; Geishecker, 2005)
- Effect of outsourcing on productivity at industry and firm level (Amiti and Wei, 2006; Görg, Hanley and Strobl, 2008)
- Magnitude of services outsourcing low in US and UK (Amiti and Wei, 2005) - but higher in Ireland

Background

- Theory on outsourcing and innovation – Glass and Saggi, 2001
- Two country model with Ricardian technology differences
- Potential wage savings mean North outsources to South “low skill” activities
- Wage in North falls due to outsourcing
- Firms’ profits rise, new investment in R&D

Hypotheses to be investigated

- International outsourcing has negative effect on wage rate
- International outsourcing raises innovation through “wage channel”
- Possible non-wage effects on innovation:
 - ◆ direct restructuring
 - ◆ learning and implementing new technologies

Methodology (1)

$$(R \& D / Y)_{it} = \beta_1 outs_{it-1} + \beta_2 \ln wage_{it-1} + \beta_3 X_{it-1} + d_t + d_j + \mu_i + \varepsilon_{it}$$

- Innovation measured as R&D intensity
- Outsourcing defined as imported services divided by sales
- Wage is average remuneration per employee
- X includes size, foreign ownership, export dummy, training dummy
- d are industry and time dummies
- Plant specific and random error term

Methodology (2)

$$\ln(wage)_{it} = \gamma_1 outs_{it-1} + \gamma_2 Z_{it-1} + d_t + d_j + v_i + \phi_{it}$$

- “wage channel” in Glass and Saggi (2001) - $\gamma_1 < 0$
- Z includes size, foreign ownership, export dummy, training dummy, material intensity

Methodology (3)

- Within-transform both equations
- Three estimation approaches:
 - ◆ Estimate 1) and 2) separately with *outs* assumed exogenous
 - ◆ Allow *outs* to be endogenous (instruments used: exports to the UK, percentage of inputs sourced over the web), test for instrument validity and relevance
 - ◆ Estimate 1) and 2) simultaneously allowing *outs* to be endogenous

Data description

- Plant level data from *Annual Business Survey of Economic Impact* (ABSEI) collected by Forfás
- Survey of plants with at least 10 employees
- Response rate generally around 60% of targeted population
- Provides information on output, employment, exports, imported services, wages, R&D expenditure, etc.
- Period 2000 - 2004

Key variables

		2000	2001	2002	2003	2004
Services outsourcing	mean	0.032	0.034	0.041	0.041	0.042
	median	0.006	0.005	0.005	0.005	0.007
	std.dev.	0.103	0.126	0.203	0.198	0.164
	obs.	2317	2357	2375	2306	1997
R&D intensity	mean	0.120	0.213	0.610	0.479	0.142
	median	0.000	0.001	0.002	0.002	0.003
	std.dev.	1.711	2.251	14.438	13.595	1.003
	obs.	2319	2357	2375	2306	1997
Average wage	mean	29.106	32.657	35.185	36.977	39.192
	median	25.0	27.8	30.2	32.2	34.2
	std.dev.	26.376	21.773	21.899	22.588	32.386
	obs.	2350	2406	2430	2364	2036

Note: overall R&D intensity: 0.8% of GDP in 1998 (OECD)

Plant characteristics and outsourcing

		R&D intensity	Average wage	employment	training intensity	export intensity
No services outsourcing	mean	0.153	23.442	77.813	0.009	0.352
	std.dev.	2.681	25.458	197.501	0.063	0.393
	obs.	5676	5661	5676	5676	5676
Services outsourcing	mean	0.483	36.628	121.530	0.014	0.566
	std.dev.	12.600	25.023	290.814	0.231	0.398
	obs.	5676	5675	5676	5676	5676

Which industries outsource?

STAN code		no.	%
3 highest			
13	Transport and storage	43	66.2
2	Textiles, leather and footwear	276	59.6
5	Chemicals, rubber & plastics	679	58.4
3 lowest			
7	Basic and fabricated metal products	373	37.5
4	Pulp, paper, printing & publishing	183	36.8
12	Hotels and restaurants	7	33.3

Results 1: FE for all plants

	(1)	(2)
<i>Sample</i>	<i>all</i>	<i>all</i>
<i>Dependent variable</i>	<i>r&d int</i>	<i>wages</i>
Outsourcing intensity t-1	-0.030	-0.009
	(0.385)	(0.014)
Wages t-1	-0.105	
	(0.300)	
Employment t-1	-0.077	0.091
	(0.356)	(0.012)***
Observations	8054	8054
Number of plants	2854	2854
R-squared	0.00	0.08

Results 2: FE for split sample

	<i>manufacturing</i>	<i>manufacturing</i>	<i>services</i>	<i>services</i>
<i>Sample</i>				
<i>Dependent variable</i>	<i>r&d int</i>	<i>wages</i>	<i>r&d int</i>	<i>wages</i>
Outsourcing intensity t-1	0.667	-0.034	-0.162	-0.006
	(0.169)***	(0.030)	(0.832)	(0.020)
Wages t-1	-0.240		-0.150	
	(0.080)***		(0.882)	
Employment t-1	0.130	0.088	-0.110	0.090
	(0.092)	(0.015)***	(0.975)	(0.023)***
Observations	5894	5894	2160	2160
Number of plants	2022	2022	832	832
R-squared	0.01	0.14	0.00	0.03

Results 3: IV estimations

<i>Sample</i>	<i>manufacturing</i>	<i>manufacturing</i>	<i>services</i>	<i>services</i>
<i>Dependent variable</i>	<i>r&d int</i>	<i>wages</i>	<i>r&d int</i>	<i>wages</i>
Outsourcing intensity t-1	4.878	0.004	-2.776	0.037
	(1.756)***	(0.015)	(2.163)	(0.072)
Wages t-1	-0.132		-0.336	
	(0.075)*		(0.648)	
Employment t-1	-0.167	0.131	0.436	0.103
	(0.084)**	(0.020)***	(0.947)	(0.031)***
Sargan statistic (p-value)	0.21	0.54	0.95	0.14
first stage f test (p-value)	0.00	0.04	0.13	0.14
Observations	5474	5491	2067	2082

Results 4: 3SLS

<i>sample</i>	<i>manufacturing</i>	<i>manufacturing</i>	<i>services</i>	<i>services</i>
<i>dependent variable</i>	<i>r&d int</i>	<i>wages</i>	<i>r&d int</i>	<i>wages</i>
Outsourcing intensity t-1	2.538	-0.017	-2.732	0.005
	(0.100)***	(0.024)	(0.113)***	(0.003)
Wages t-1	-0.156		-0.389	
	(0.064)**		(0.644)	
Employment t-1	-0.151	0.149	0.420	0.130
	(0.073)**	(0.013)***	(0.772)	(0.024)***
Observations	5474	5474	2067	2067

Conclusion

- Recent developments in Web and other media improve scope for international outsourcing of service inputs
- Firm may increase innovation with increases in internationally outsourced services
- Our results somewhat agree with Glass and Saggi (2001) (+ive relationship between offshored services and R&D)
- This only holds for manufacturing firms
- This positive effect does not work through the wage channel, contrary to G-S
- Further work: what are the channels? What is happening in the services sector?