Putting Scotland's high growth firms in their place

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- The OECD (2006) definition of a high growth firm (hgf) emerged as a by-product of the investigation of a (pareto-type) proposition attributed to David Birch:

  > *a **relatively small** proportion of firms account for a **relatively large** proportion of job creation*

- whilst hgfs have attracted considerable attention there is (as yet) relatively little reliable knowledge
- this presentation summarizes the results of an ongoing work programme
  - the evolution of hgf incidence in the uk
  - hgf incidence & characteristics, age, size, sector: uk
  - evolution of hgf incidence: scotland
  - contribution of hgfs to job creation in the uk and scotland
  - distribution of hgfs across local authorities in great britain

- we use data from the UK Business Structure Database (compiled by the Office for National Statistics) on the population of private sector firms for the period 1997 to 2010
- the BSD is a series of annual 'snapshots' from the Inter-Departmental Business Register capturing information from VAT returns and employer PAYE tax information and social security records
- we have linked the annual snapshots from the BSD using firm identifiers to form a longitudinal firm-level database for the UK

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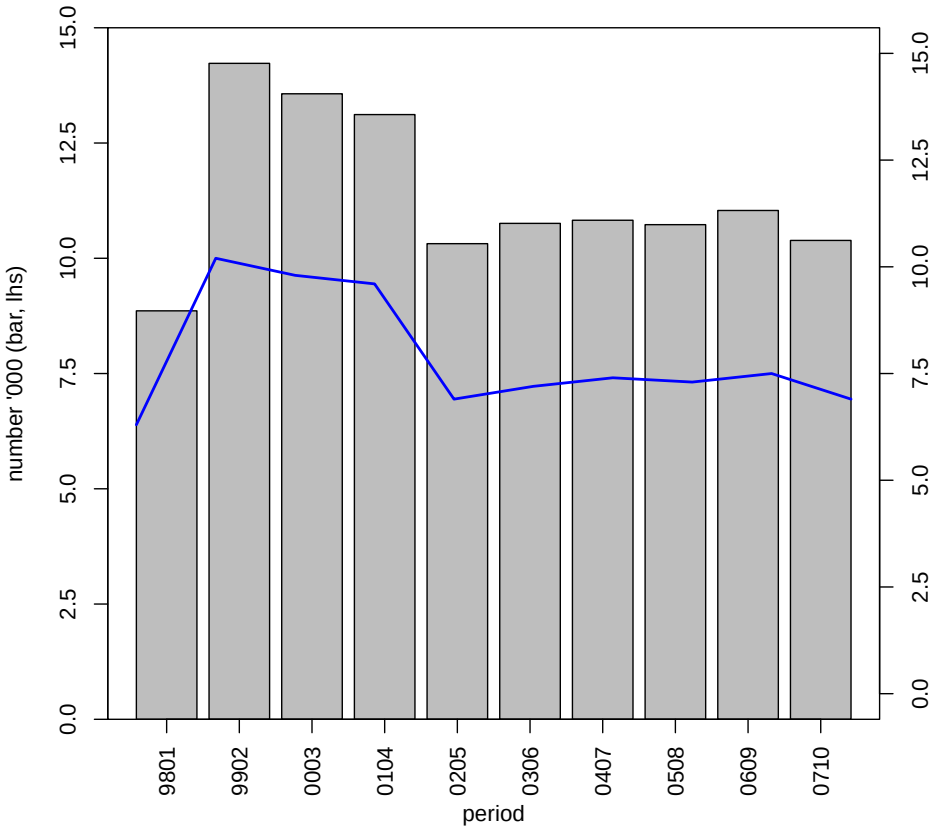
the OECD metric for identifying an hgf requires that,

- the firm is born before the beginning of the period
- the firm is alive at the end of the period
- the firm has at least 10 employees at the beginning of the period and records an annual average growth of 20% in employment over the period (72.8% over 3 years)

this definition implies that in each period we will have a 'balanced panel' of firms – the number of firms remains the same – and we define the hgf incidence rate as the number of hgfs divided by the number of firms at the beginning of the period with 10+ employees

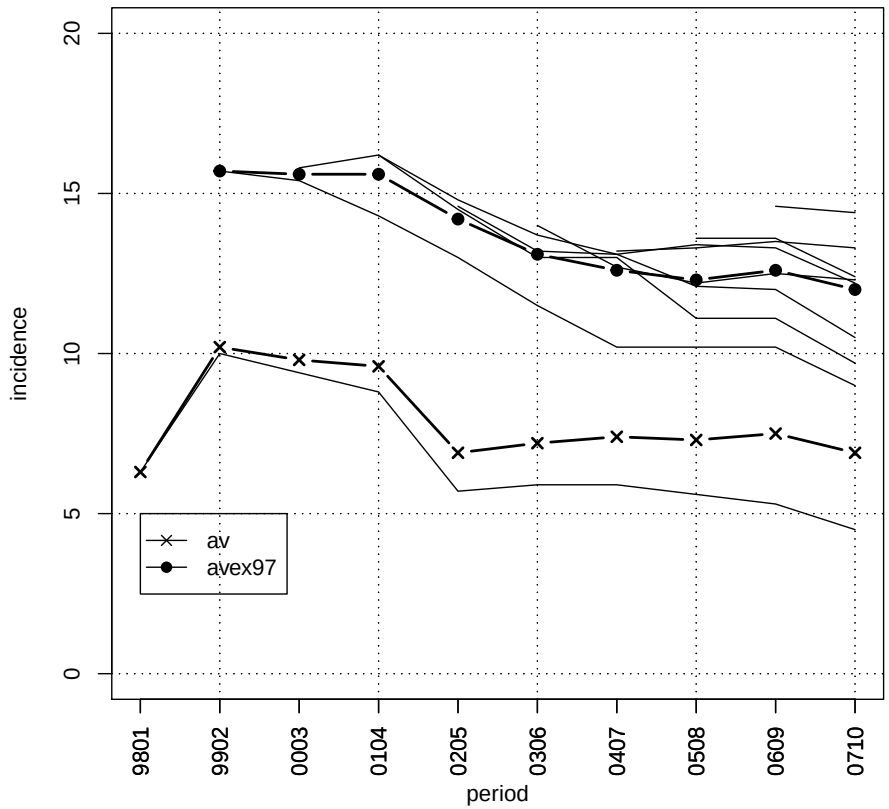
we use 3 years as our 'period': starting with 1998 so there are ten 3-year periods: from 1998/2001 to 2007/2010.

figure 1: incidence over time, uk



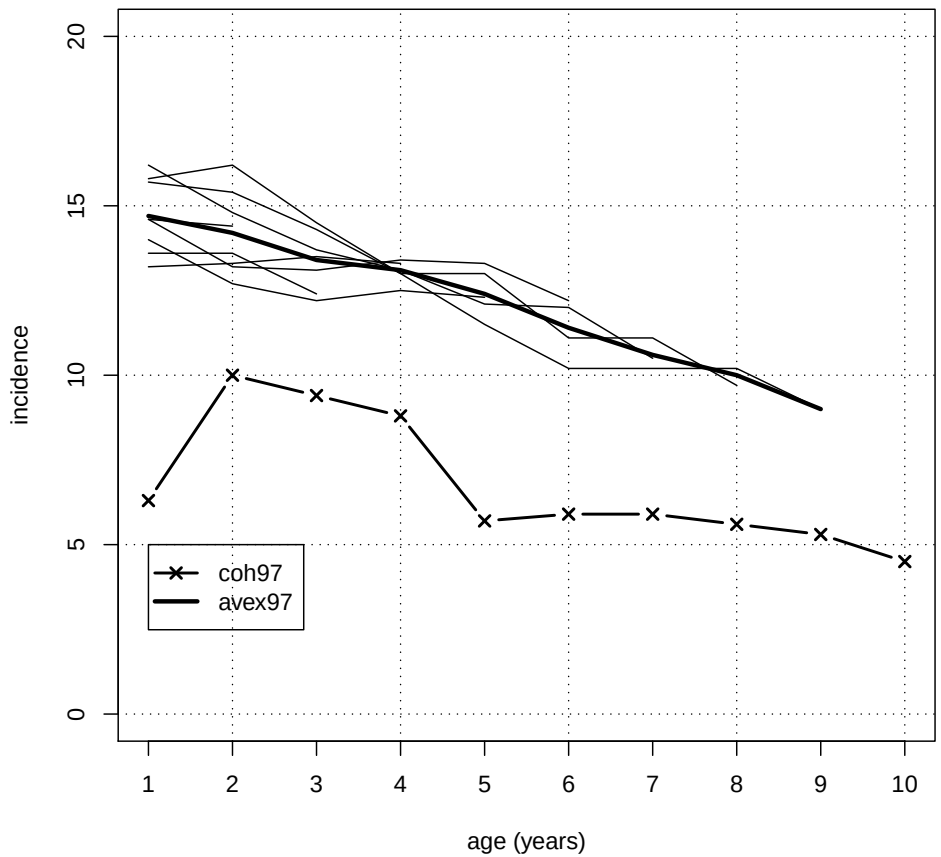
- hgf numbers: bar with left hand scale; hgf rate: line with right hand scale
- hgf numbers since 2002/2005 have been around 10 thousand per period
- the 1998/2001 figure is very low and was followed by a 'bulge' when numbers were closer to 13 thousand
- during the 'bulge' incidence was 8% to 10%, since 2002/2005 has been between 6% and 8%

figure 2: incidence over time, by cohort



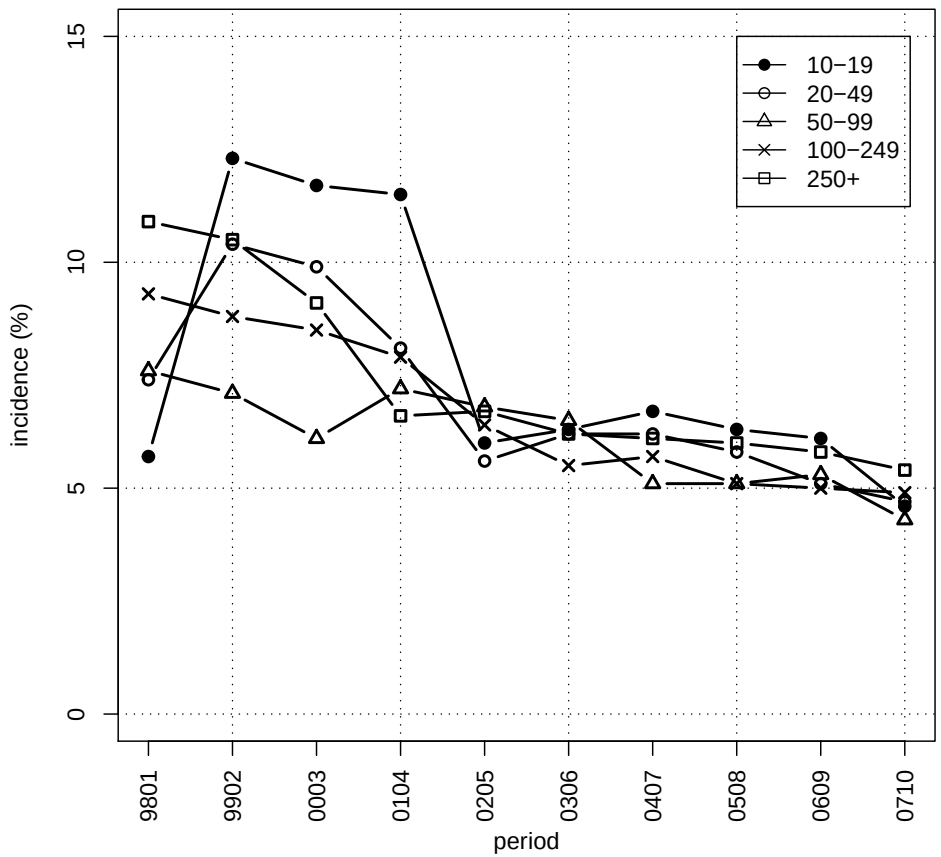
- cohort97 not a 'true' birth cohort: mixture of all ages
- incidence for cohort97 very much lower than 'average' incidence excluding cohort97
- cohort97 (proximate) cause of the 'bulge'
- incidence for cohorts except cohort97 typically downward sloping over time – cohort97 from 1999/2002 onwards
- may be easier to visualise if plotted against age

figure 3: incidence by age, by cohort



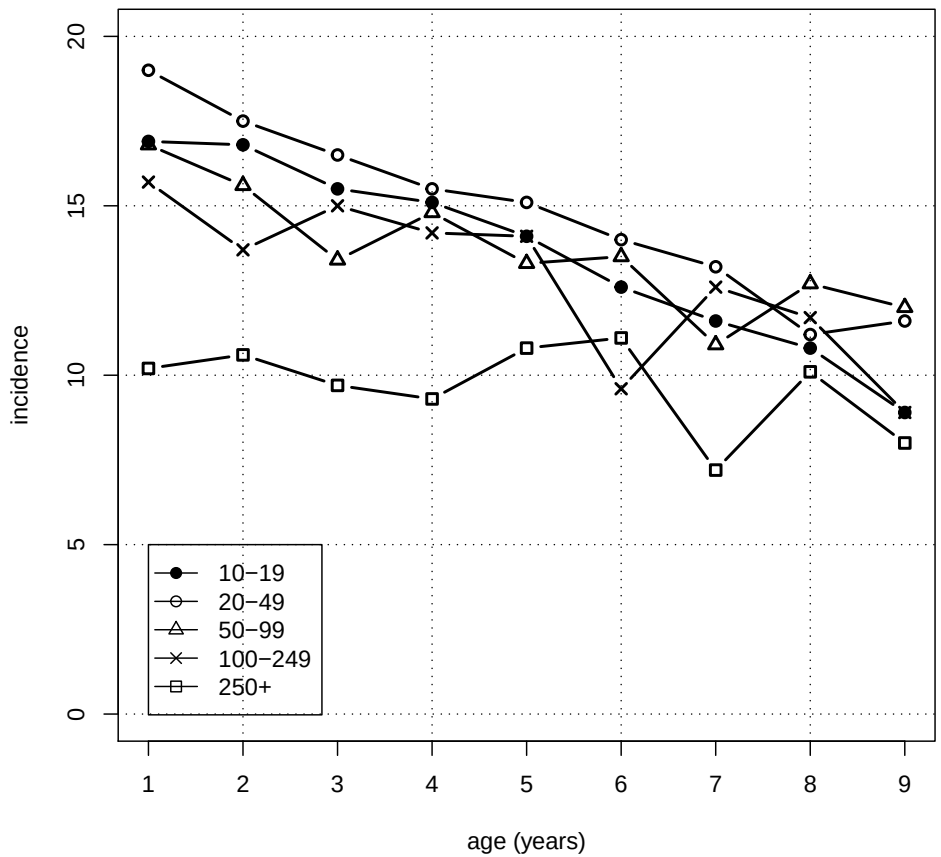
- for all cohorts (except cohort97) incidence between 13% and 16% at age 1
- earlier cohorts (98, 99, 00) closer to 16%, later cohorts closer to 14%
- necessarily fewer observations on older ages – but notice 'average' declines by about 0.5 percentage points per extra year of age
- if incidence declines with age: what does this tell us about growth?

figure 5: incidence by period & size



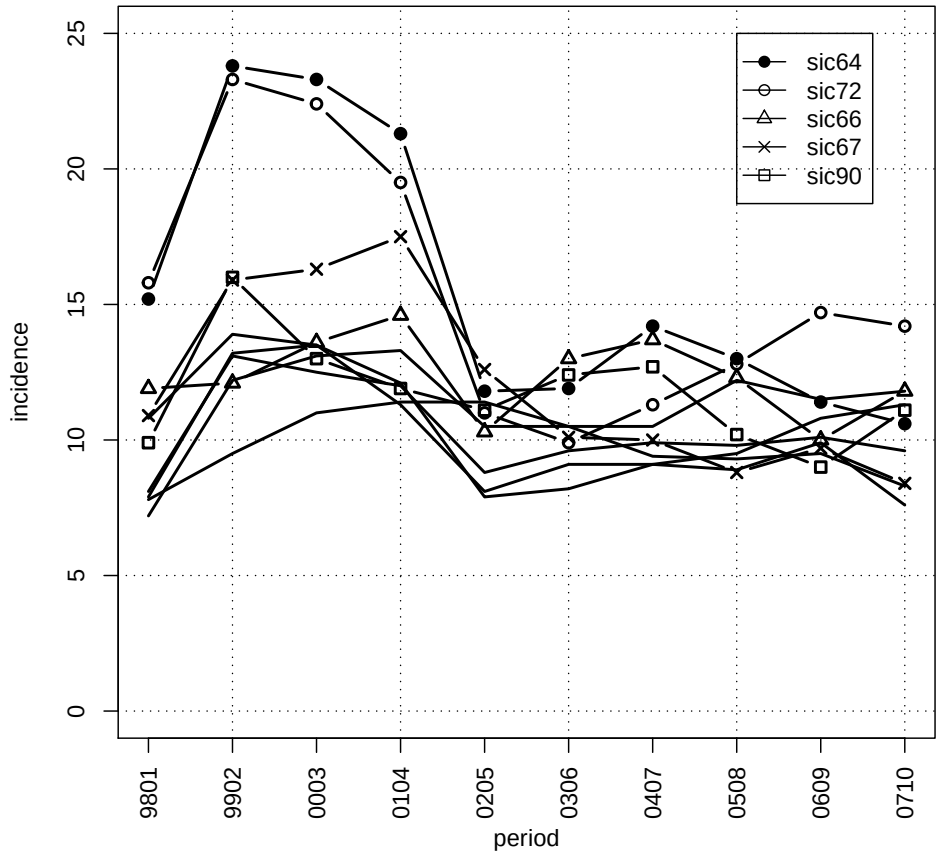
- we know cohort97 dominates so separate
- looks like very similar to figure 1
- most other size-bands show decline – all flatten 2002/2005
- no clear and/or stable ranking by size

figure 6: incidence by size and age, av all cohorts (exc97)



- clear & stable pattern
- most size-bands decline with age – except 250+ which is flat
- 20 to 49 largest incidence, but differential declines with age
- again, incidence declines with age, size effect second order

figure 7: incidence by 2 digit sic: top 10



average rank 2002/05–2007/10 – top 5 labelled

1. 64 – Post & telecommunications
2. 72 – Computer & related activities
3. 66 – Insurance & pension funds
4. 67 – Activities auxiliary to finance
5. 90 – Sewage & refuse disposal

top 10 by average rank (2002/05 – 2007/10),

1. 64 – Post & telecommunications
2. 72 – Computer & related activities
3. 66 – Insurance & pension funds
4. 67 – Activities auxiliary to finance
5. 90 – Sewage & refuse disposal
6. 73 – Research & development
7. 74 – Business services
8. 93 – Other service activities (hairdressing, funerals, fitness)
9. 65 – Financial intermediation
10. 71 – Renting machinery & equipment

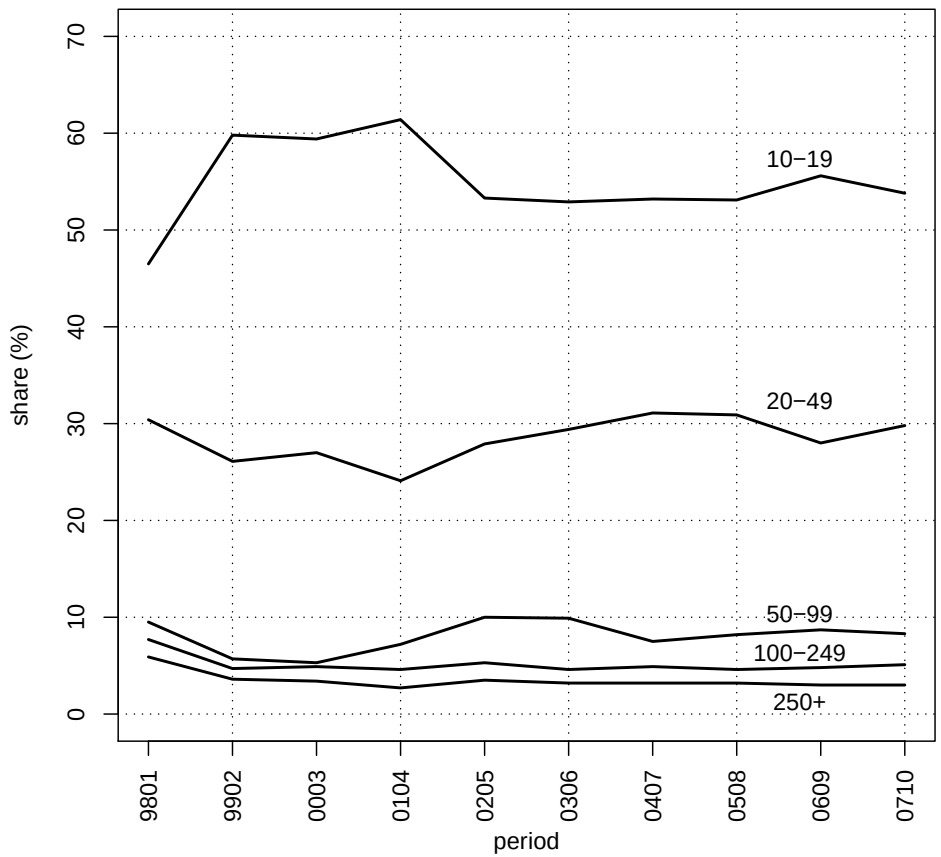
'tech' boom 1999/02 to 2001/04; finance later; age effects?

hgfs by age, 2007/10

age	share
1	5.9
2	6.8
3	6.9
4	7.4
5	6.9
6	6.7
7	5.8
8	4.7
9	4.8
10+	44.1

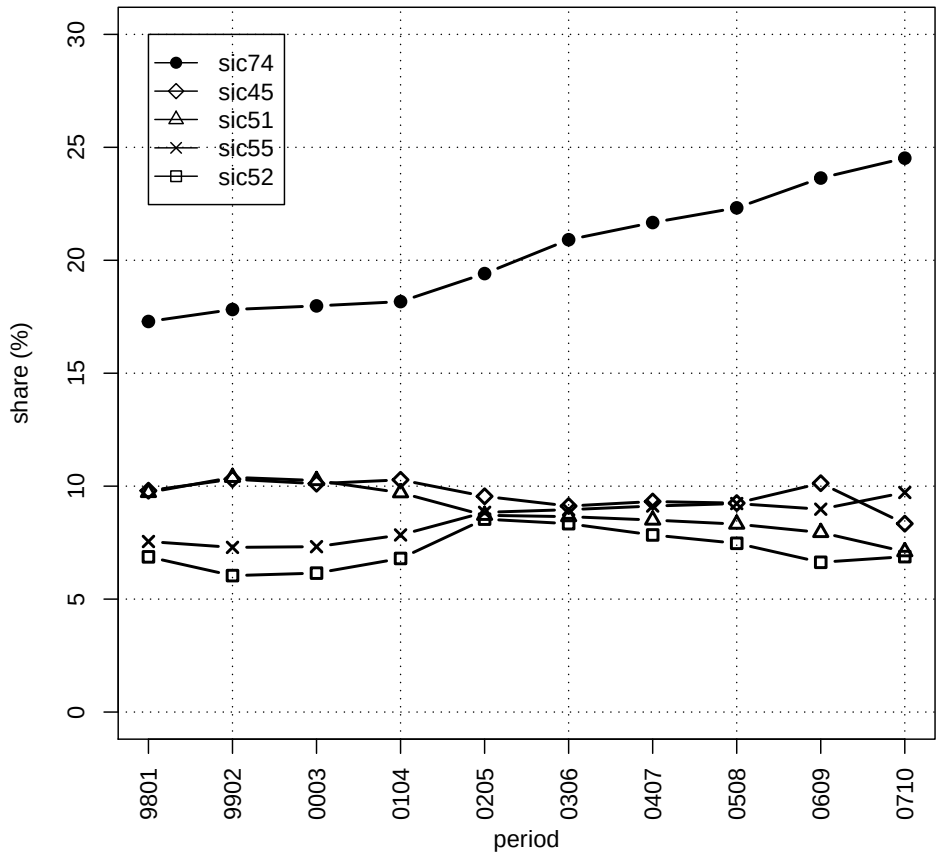
- age: years since birth
- firms aged 10+ in 2007/10 born 1997 or before
- even though incidence of coh97 is low in 2007/10, there are very many more coh97 firms

figure 8: hgf distribution by size-band vs period (%)



- very different from incidence by age (figure 5)
- many more small – 10–19 – firms
- so more than half of hgfs 10–19

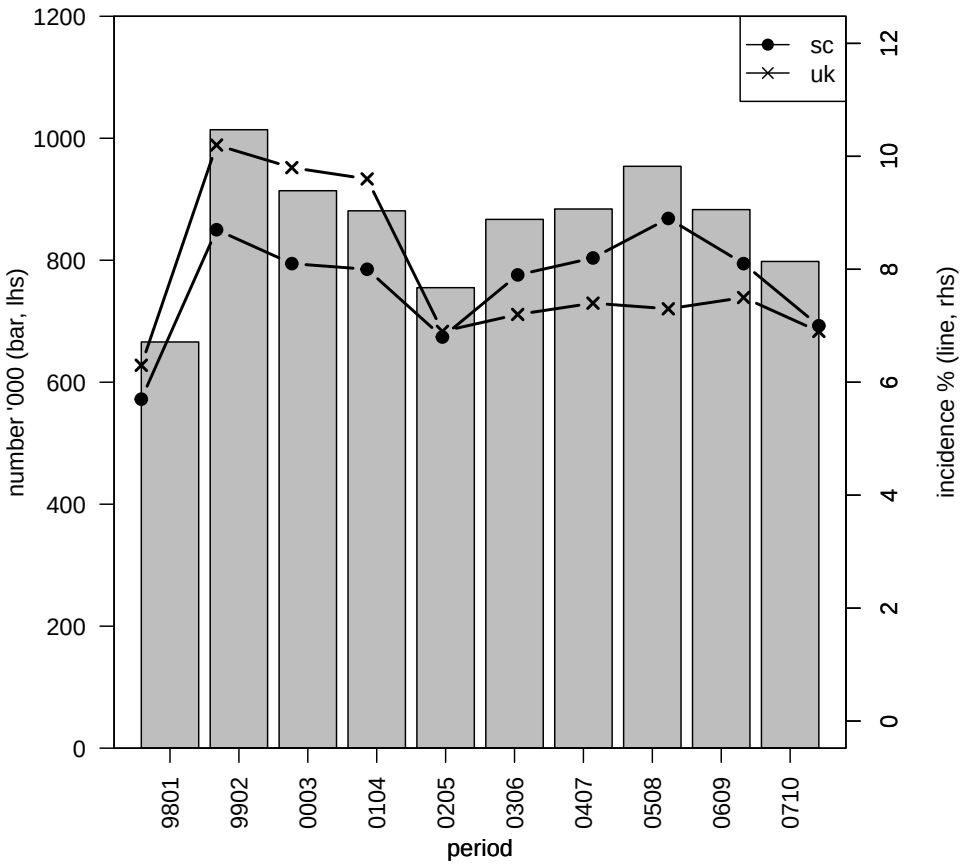
figure 9: hgf distribution by sector vs period, top 5 sectors(%)



key:

- sic74, business services
- sic45, construction
- sic51, wholesale distribution
- sic52, retail distribution
- sic55, hotels and restaurants

figure 10: scotland hgf numbers & incidence rate (%) scotland, uk



- Scotland's hgf numbers fluctuate between 600 & 1000
- Scotland's incidence rate fluctuates between 6% and 8%
- incidence rate time pattern differs from UK: below 1998/01 to 2002/05; above 2003/06 to 2006/09
- note: Scotland's share of UK hgf between 7% and 9% (not shown on figure)

- hgf definition focuses on growth over a 3 year period – t to (t+3) – so consistency requires 3 year measurement period to investigate hgf contribution to job creation (jcr)
- start by distinguishing jcr by hgfs from jcr by not-high growth firms (nonhgfs) t to (t+3)
- ***but*** the OECD definition covers only firms which are at least one year old i.e. alive in (t-1), however consistent accounting for all jcr between t and (t+3), ***must*** include firms which create jobs but are not either hgfs or nonhgfs
- in brief, the OECD hgf definition *does not cover*:
  - any firms born *in period t* and alive in period (t+3)
  - any firm born *after period t* up to and including period (t+3)

so there are four categories,

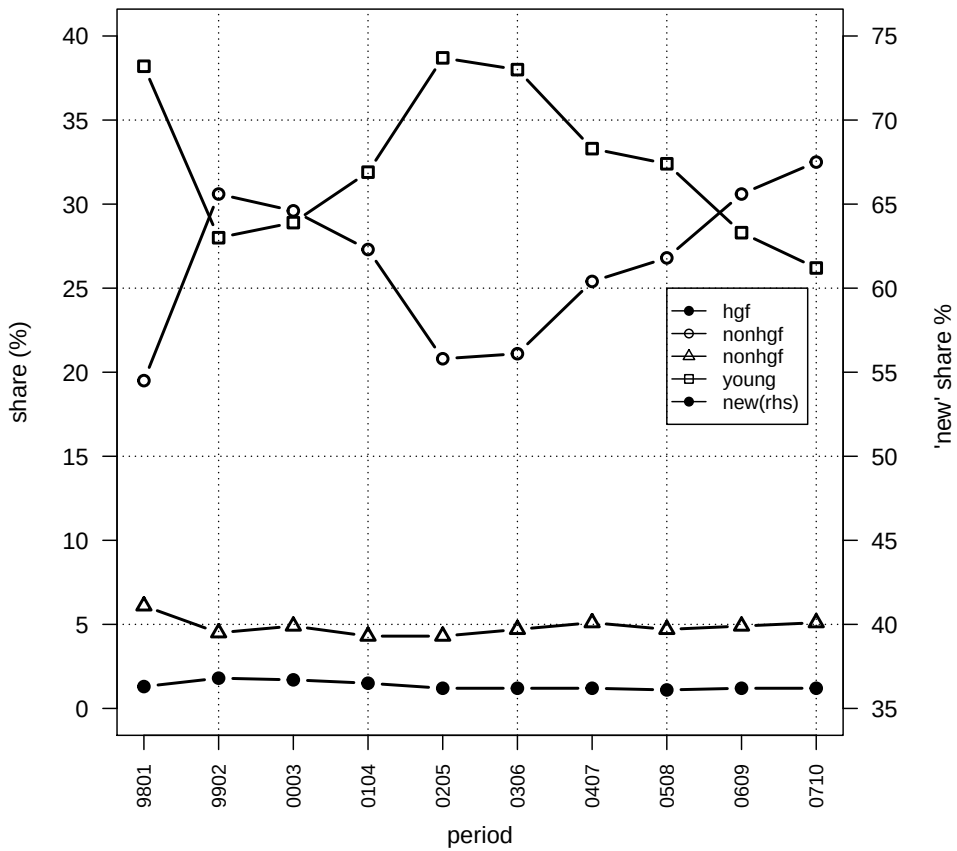
1. hgfs, firms born before t, and alive (t+3), at least 10 jobs in t and 20% average annual growth between t and (t+3) – *hgf*
2. nonhgfs, firms born before t and alive (t+3) with more jobs in (t+3) than t, but not hgf – *nonhgf*
3. firms born in period t and alive (t+3) with more jobs in (t+3) than t – *young*
4. firms born after period t and alive (t+3) with jobs in (t+3) – *new*

the stock of all *job creating firms* alive at time (t+3) ($firms_{t+3}$) can be written as the sum of its components:

$$\begin{aligned} firms_{t+3} \equiv\ & hgf_{(uptot),t+3} + nonhgf_{(uptot),t+3} + \\ & + young_{t,t+3} + new_{(aftert),t+3} \end{aligned} \tag{1}$$

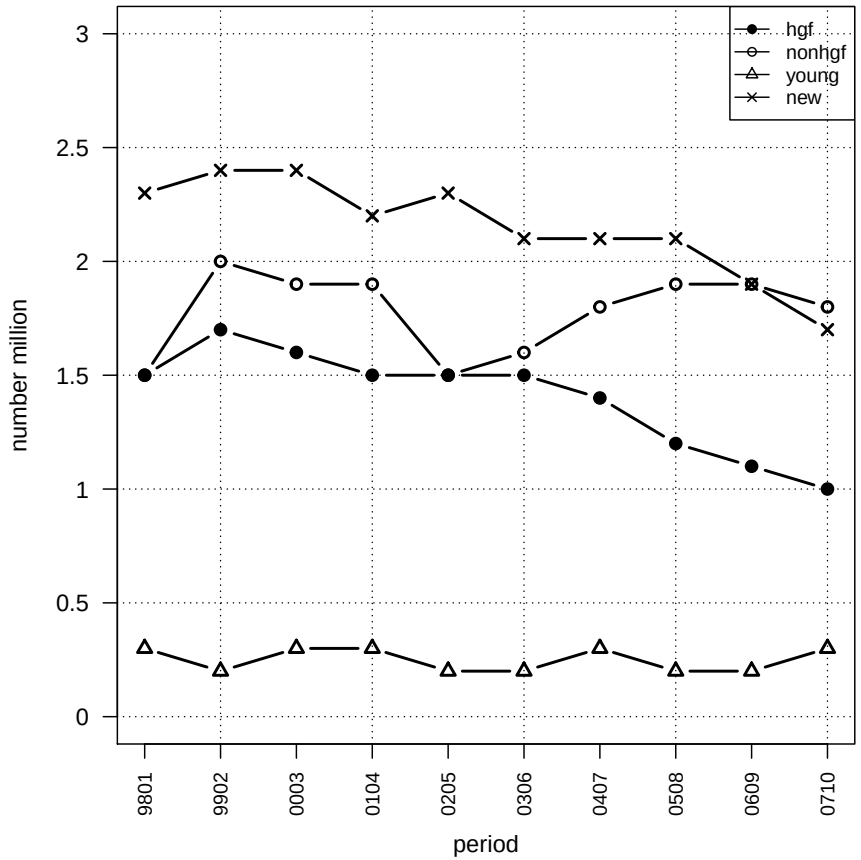
where the first in each pair of subscripts refer to the year of birth

figure 11: uk, job creating firms by category, share (%)



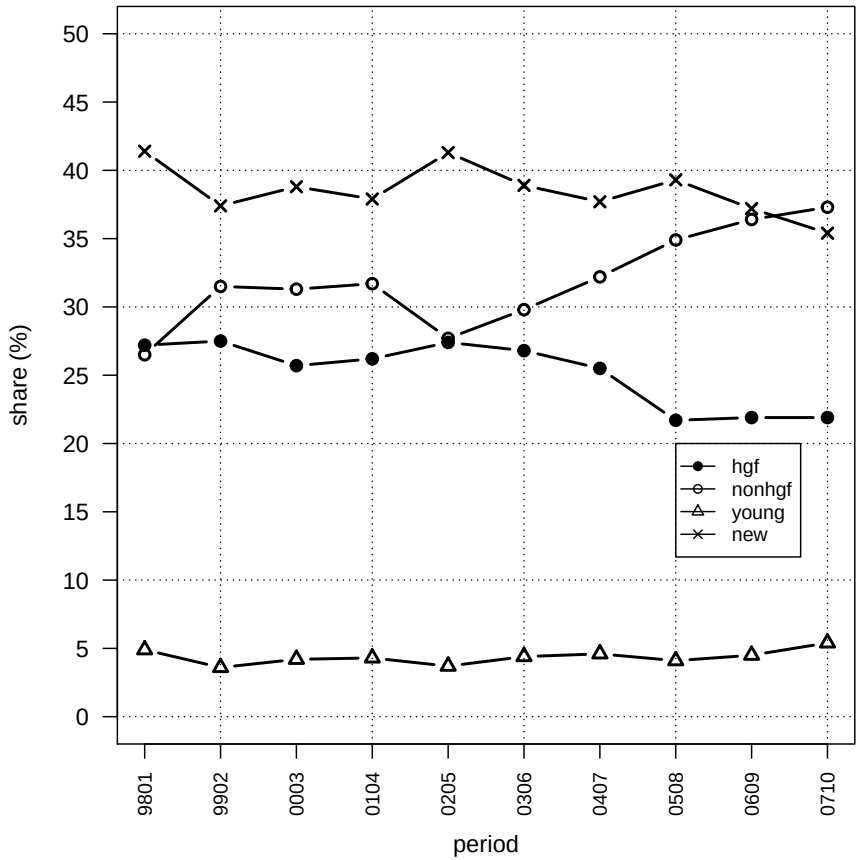
- job creating firms between 800K and 900K – about half of firms in rolling balanced panel
- new firms – less than 3 years old – account for 66% to 75%
- hgf less than 2%
- nonhgf about 30%

figure 12: uk, job creation by category of job creating firm, million



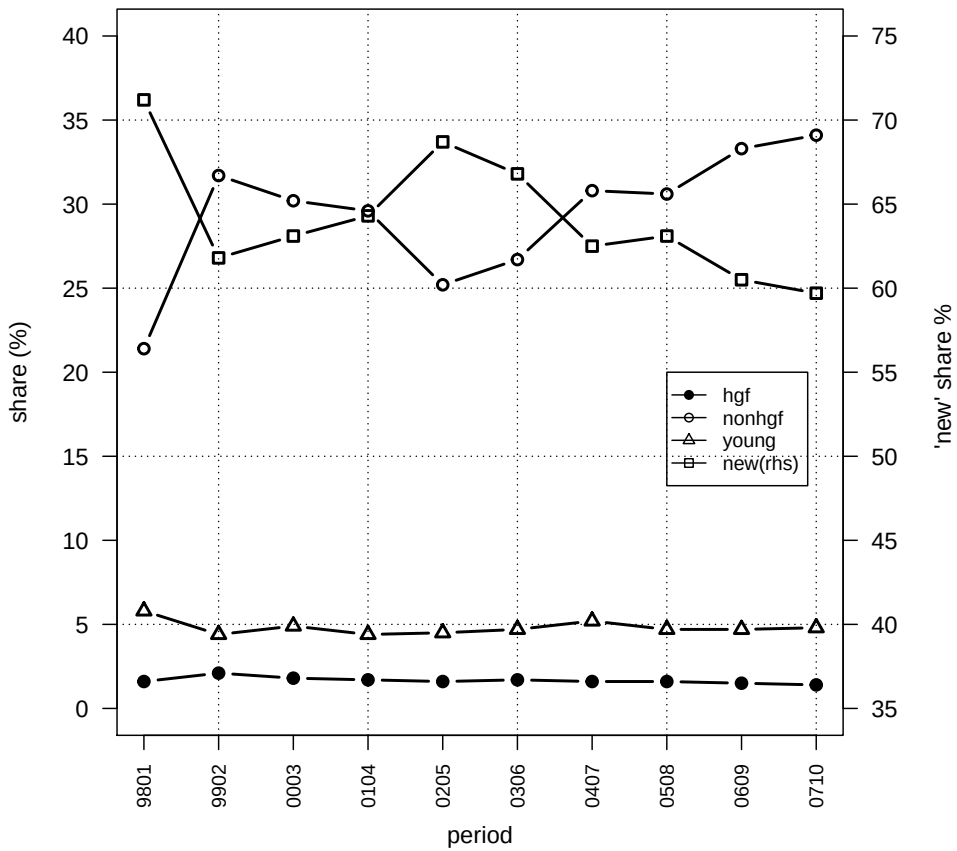
- jcr falls by 1m, from 5.5m (1998/01) in 4.5m (2007/10)
- steep fall in hgf after 2003/06 – down 0.5m
- fall in new – steep after 2005/08

figure 13: uk, job creation by category of job creating firm, share (%)



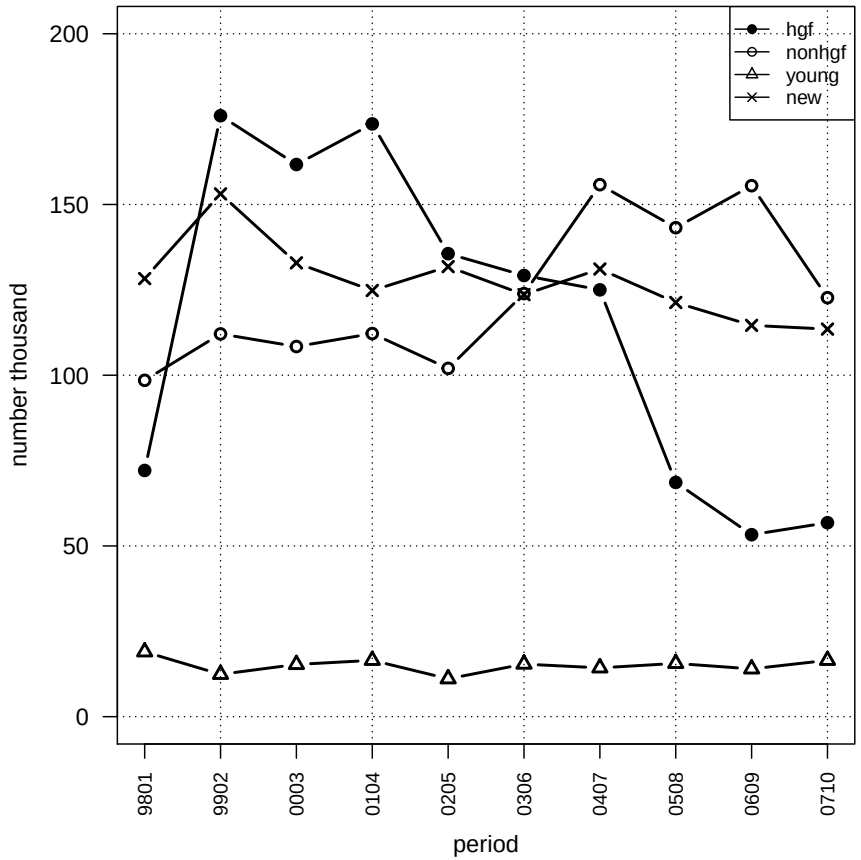
- fall in share of hgf and new – both down 5%
- rise in share of nonhgf by 10%

figure 14: scotland, job creating firms by category, share (%)



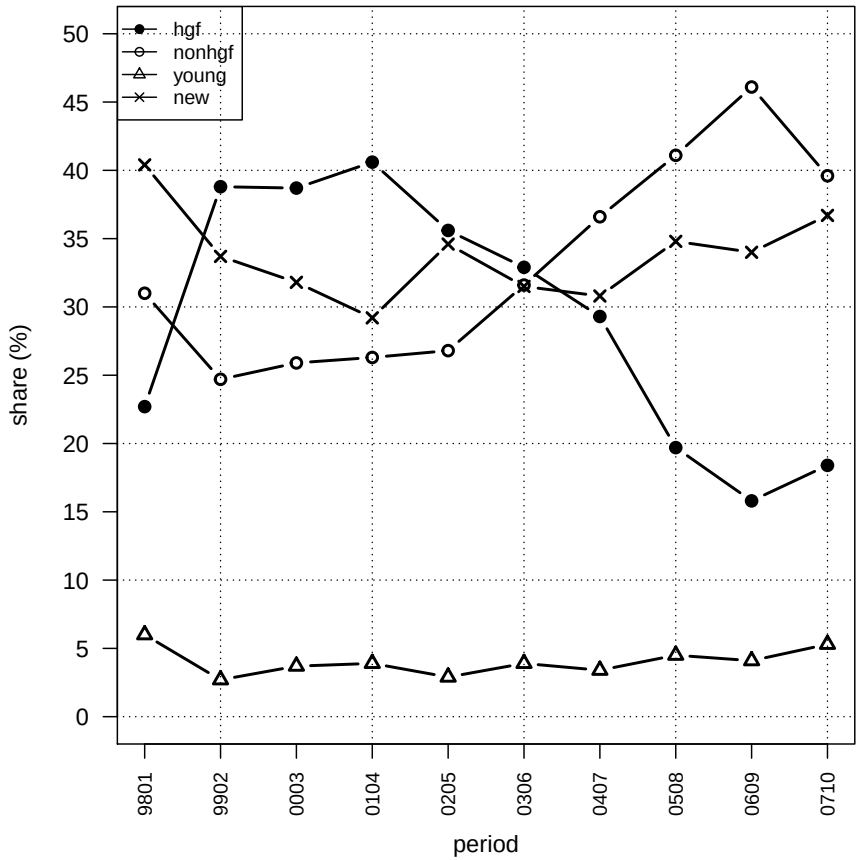
- jcr firm numbers up from 42K to 56K – about 66% of firms in rolling balanced panel
- new – 60% to 70%
- nonhgf 25% to 30%
- hgf about 2.5%

figure 15: scotland, job creation by category of firm, '000)



- jcr about 300K to 400K
- hgf jobs down 100K after 2001/04
- nonhgf jobs up by 50K after 2002/05
- new fairly stable about 125K

figure 16: scotland, job creation by category of job creating firm, share (%)



- hgf 40% 1999/02 to 2001/04, then down to 20%
- nonhgf up from 25% to 40%
- new about 35%

figure 17: scotland & uk, job creation by hgf & nonhgf, share (%)

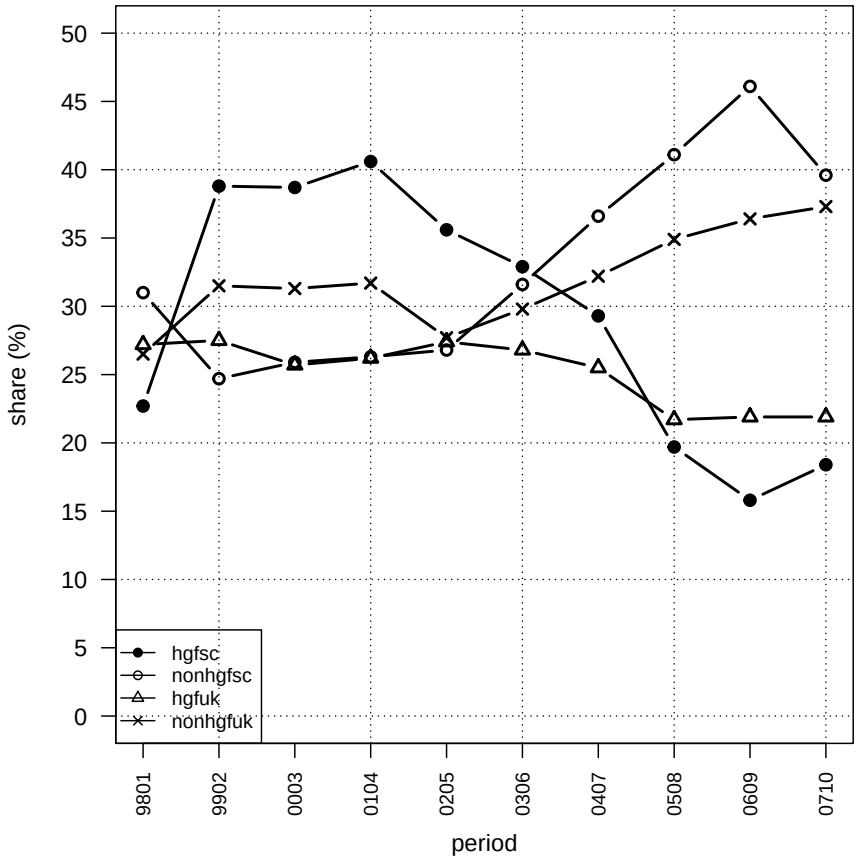
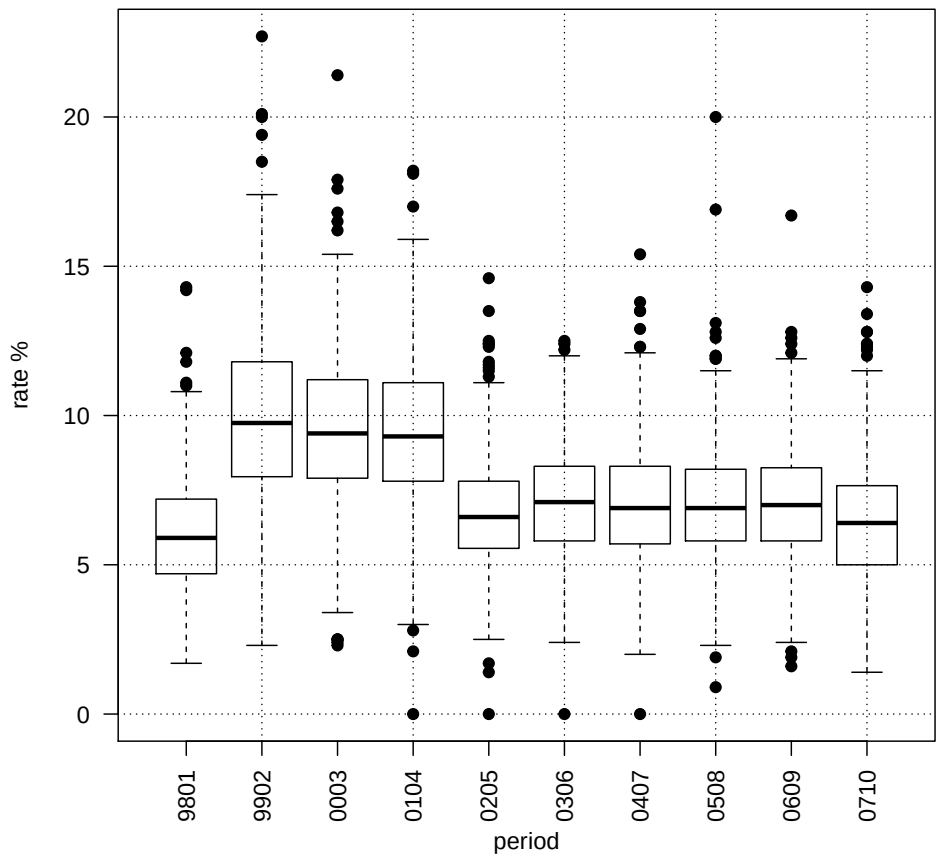
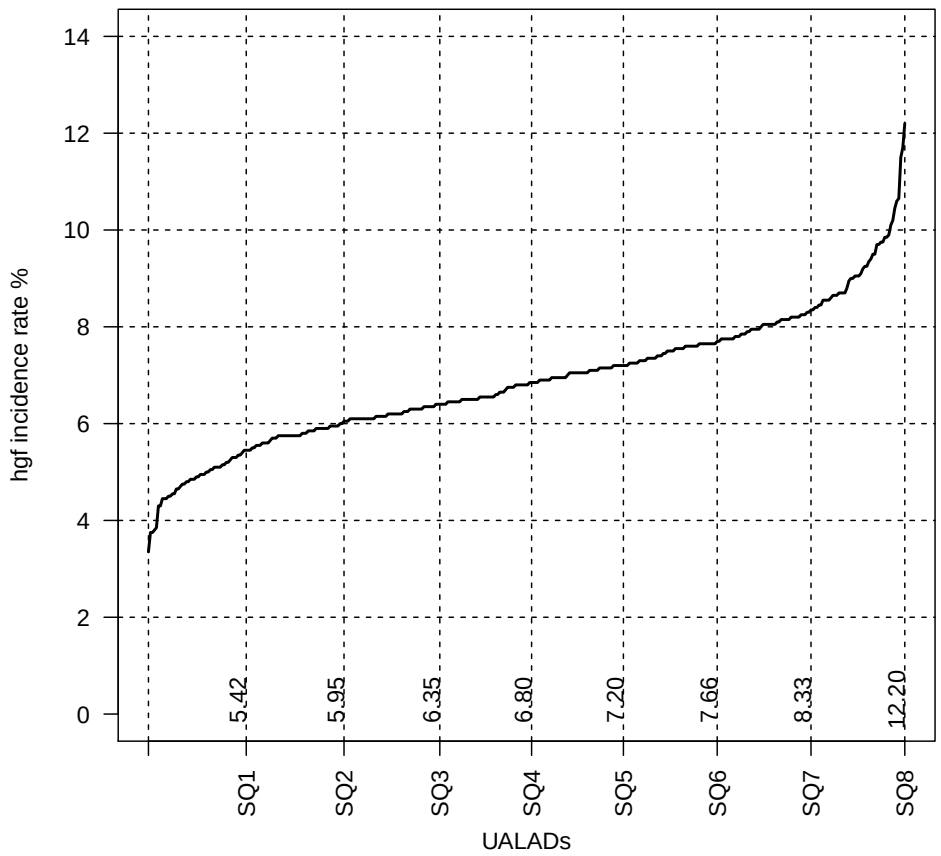


figure 18: hgf incidence rate for UALADs, boxplots by period



- the line in the middle of a box is the median for that period
- the box is drawn from the first to the third quartile, that is its height is the inter-quartile range (IQR)
- the lines extending from the box and ending in a bar are each 1.5×IQR
- the points beyond the bar at the end of the lines are outliers – observations which exceed the 1.5×IQR

figure 19: hgf incidence rate for UALADs, ordered plot of median



- minimum: 3.35
- SQ1: 5.42
- SQ2: 5.95
- SQ3: 6.35
- SQ4: 6.80
- SQ5: 7.20
- SQ6: 7.66
- SQ7: 8.33
- SQ8 (max): 12.20
- very little variation: SQ2 to SQ6

Table 2: hgf incidence rate for UALADs, by SQ across regions

SQ	SQ1	SQ2	SQ3	SQ4	SQ5	SQ6	SQ7	SQ8	sum	'excess'
EM	5	6	11	7	4	3	2	2	40	-3
EN	8	9	2	3	6	11	6	2	47	-4
GL	0	0	1	2	2	6	1	21	33	+17
NE	2	0	0	3	1	3	2	1	12	-1
NW	4	8	8	3	3	5	5	3	39	-2
SC	5	2	5	1	5	3	5	6	32	+2
SE	6	11	8	5	9	8	12	8	67	0
SW	4	5	4	6	8	3	4	3	37	-2
WA	3	1	1	6	3	3	4	1	22	-2
WM	9	4	3	5	2	2	5	0	30	-4
YH	3	3	5	5	3	0	1	1	21	-2
GB	49	49	48	46	46	47	47	48	380	

figure 20: London UALADS, OS grid

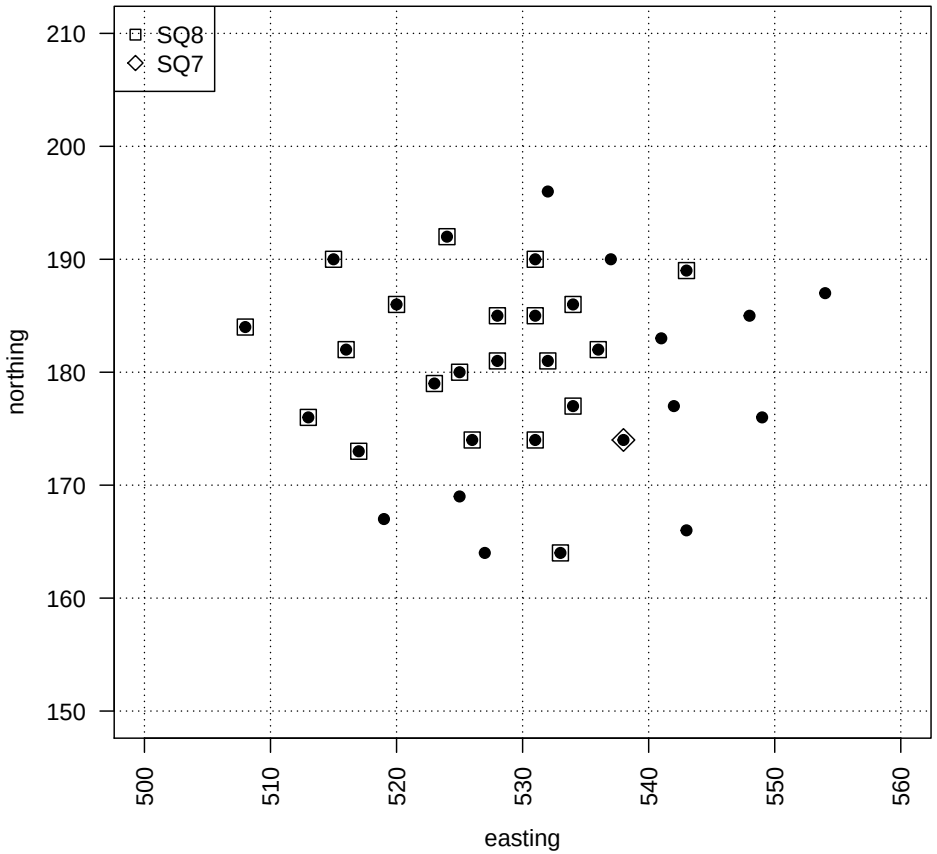
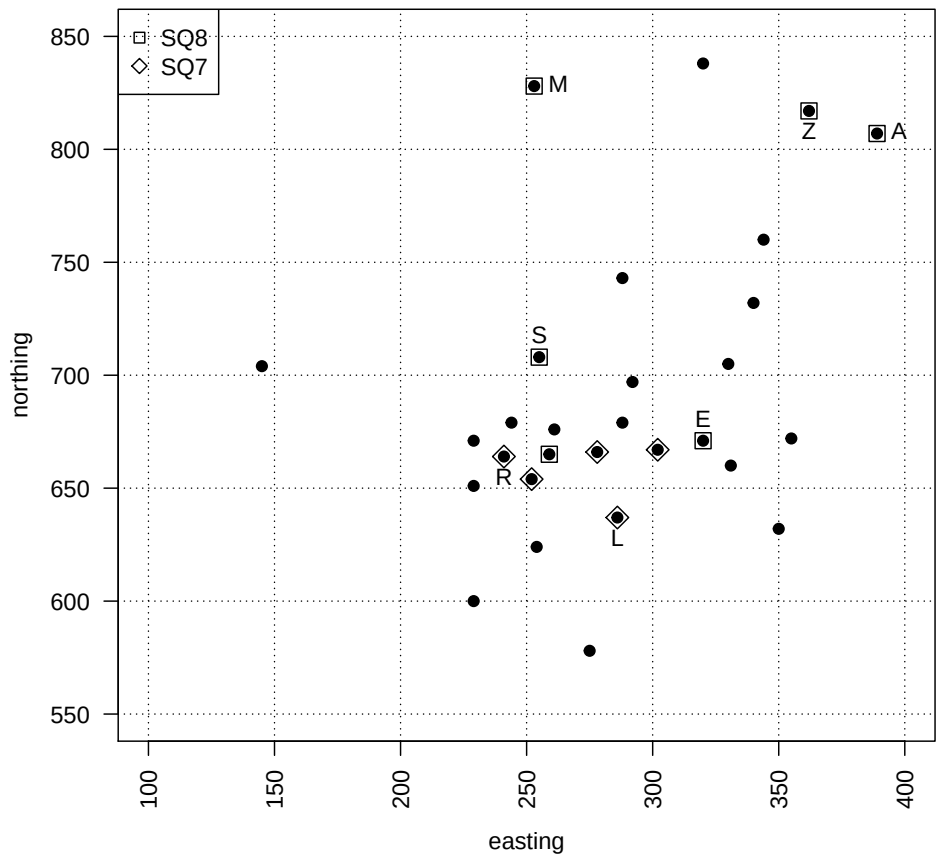


figure 21: Scotland UALADs on OS Grid



- SQ8: Aberdeen City (A); Aberdeenshire(Z); Edinburgh (E); Glasgow; Moray (M); Stirling (S)
- SQ7: E. Renfrewshire; N. Lanarkshire (N); Renfrewshire (R); S Lanarkshire (L); W. Lothian
- Eilean Siar; the Orkney Islands; and the Shetland Islands are off the grid

"We know that smaller, volatile firms are the major replacers of lost jobs, but we have no experience in identifying and assisting them in large numbers. Because they are small, we must reach many of them to have a measureable effect. Because they are volatile, we must monitor each individual firm's performance carefully if we are to gain maximum benefit from our invested dollars (on the high side) and avoid scandal (on the low side). From this researcher's viewpoint it seems like a very difficult problem to solve administratively. A massive bureaucracy would be required to monitor individual small businesses on the scale required ..." Birch [1979, p49]