

Efficiency and Productivity for District Courts in Sweden

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Outline

- › Definitions of efficiency and productivity using Data Envelopment Analysis (DEA)
- › Introduction to the audit on district courts
- › Previous literature
- › Method
- › Data
- › Results
- › Conclusions and recommendations





Efficiency and Productivity studies

- › The Swedish National Audit Office (SNAO) has studied efficiency and productivity in a number of reports
- › **Method:** Data Envelopment Analysis (DEA)
- › **Areas:**
 - Universities and University colleges (RiR 2011:2)
 - Local employment offices (RiR 2012:9)
 - District courts (RiR 2017:6)
- › **Ongoing work:**
 - Universities in the Nordic countries (To be published in 2019)
- › **Possible future work:**
 - Prisons
 - Local tax offices





What is meant with efficiency?

- › Data Envelopment Analysis (DEA) most common method to measure efficiency
 - First introduced in 1957 (Farrell) but was further developed in the late 1970s and early 1980s (Charnes, Cooper & Rhodes, Banker, Banker et al, Färe, Grosskopf & Lovell)
 - A common method for studying efficiency within the public sector
- › Efficiency is defined as “best practice”
 - If inefficiency is identified it will always be possible to become efficient by replicating another existing unit
 - Relative to the sample => In our case efficient = best in Sweden. However, is best in Sweden also best in the world?
 - Produces a relative efficiency measure





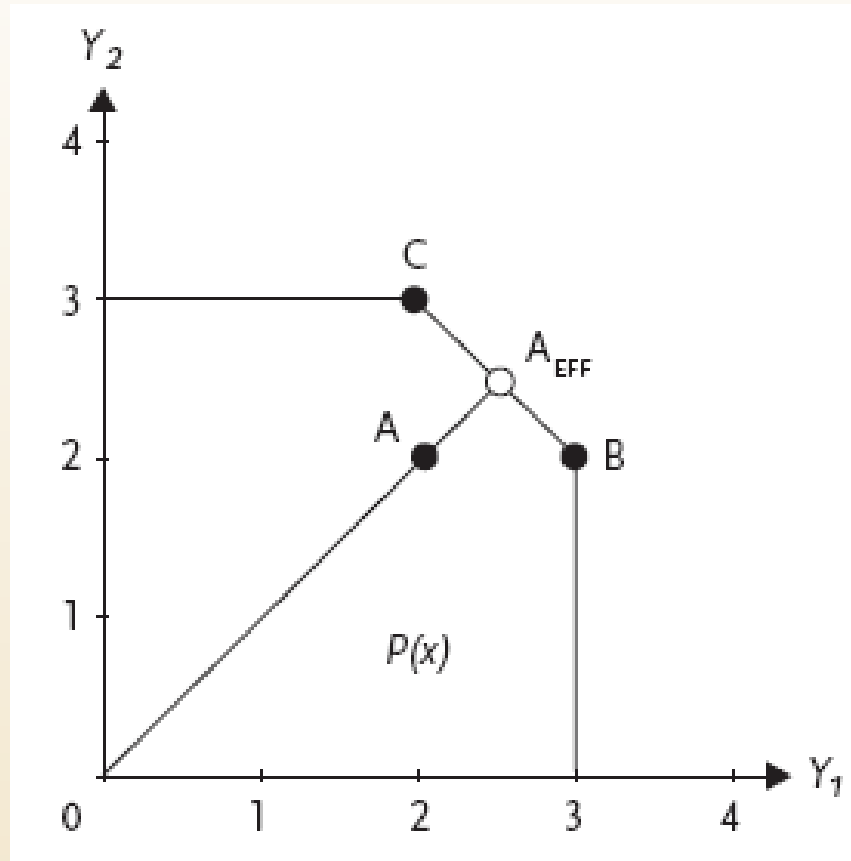
What is meant with efficiency?

- › The starting point is classic economics
- › *Production possibility frontier*:
 - Different combinations of resources (inputs) makes it possible to produce a given amount of services (outputs) \Leftrightarrow *objective*: minimize inputs at a given output level
 - Different combinations of outputs that can be produced at a given input level \Leftrightarrow *objective*: maximize output given input





Illustration of efficiency computations with DEA





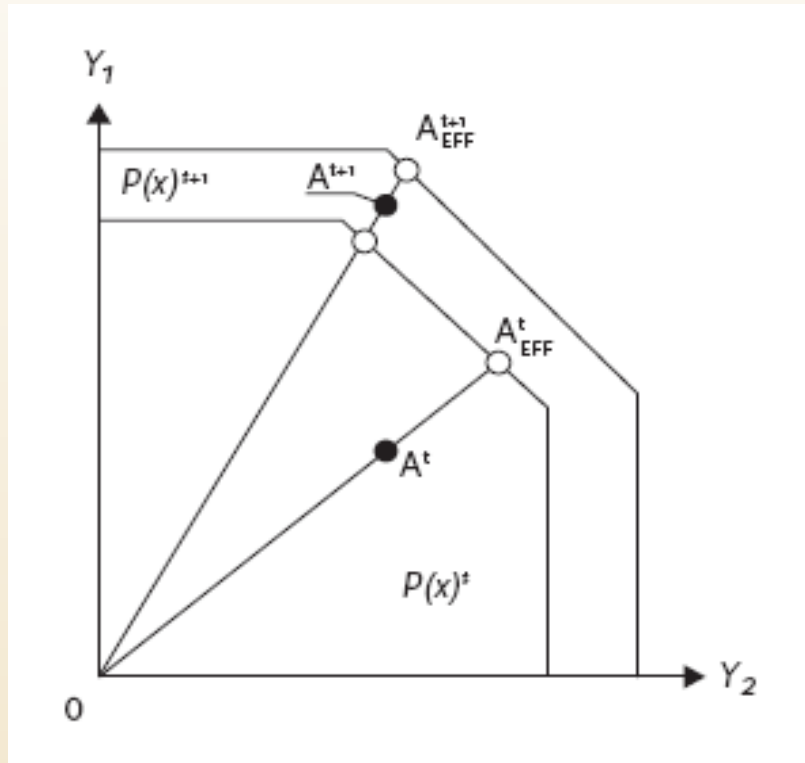
Productivity

- › Refers to changes over time, typically between two years
- › Malmquist index
- › Change can come from two possible sources
 - Changes in efficiency (becoming better or worse)
 - Changes in technology
 - *Technical progress => the frontier moves outwards with given resources*
 - *Technical regress => the frontier moves towards the origin*





Illustration of productivity computations





DEA and public policy evaluation

- › Evaluations of public policies using the DEA framework:
 - When a policy affect only a subset of units. For example:
 - *Municipalities/regions*
 - *Schools/universities*
 - *Hospitals etc.*
 - To evaluate efficiency when units are merged or split up
 - To evaluate changes in efficiency over time (productivity) when a new public policy is implemented
 - *Follow the development of productivity over time (Malmquist index)*





Efficiency and Productivity for Swedish district courts (Swedish National Audit Office 2017:6)

> **Audit question:**

- Are there any differences in efficiency between district courts?
- What are the reasons for any differences in efficiency?
- How has the productivity developed over time?

> **Period:**

- 2013-2015

> **Background:**

- A lot of courts have been closed down
- Still signs of efficiency problems in the sector





Previous studies

> **Lewin et al. (1982)**

- Courts in North Carolina
- Output-oriented CRS model
- 11 of 30 courts inefficient

> **Førsund & Kittelsen (1992)**

- Norwegian district courts (107 courts)
- Output-oriented CRS model
- Average inefficiency 10 percent

> **Recent papers by:**

- Santos & Amado (2014) for Portugal
- Nissi & Rapposelli (2010), Finocchiaro Castro & Guccio (2014, 2016) and Falavigna et al. (2015) for Italy
- Major (2015) for Polen and Ferrandino (2014) for Florida, USA





Method

- › Output-oriented Constant Returns to Scale (CRS) DEA-model
- › Bootstrapping is used for inference in the calculations of efficiency and productivity
- › **Weighting of outputs (court cases and matters):**
 - Lacking in a lot of previous research
 - Access to average hearing times for all cases and matters
 - Average hearing times (for the time period 2007-2015) for around 300 subgroups of cases and matters are used to weight all output dimensions
 - *An example: Economic crimes had a mean hearing time of **215 minutes** during the time period. Drug offences on the other hand had a mean hearing time of **57 minutes**. This implies that **3.8** drug offences are assumed to use as much resources as one economic crime*





Data

> Inputs

- Number of worked hours of regular and irregular judges of any kind
- Number of worked hours of law clerks and employees of the law clerk training programme
- Number of worked hours of other staff employed by the district court
- Office space used by the district court

> Outputs (weighted)

- Number of decided criminal, real estate and environmental cases
- Number of decided civil cases
- Number of decided court matters



Descriptive statistics

	Min	Max	Medel
Inputs			
Judges (full time equivalents)	2,4	74,7	18,0
Law clerks	2,9	91,7	18,8
Other staff	5,9	159,5	32,6
Office space (m ²)	900	25 513	4 452
Outputs			
Civil cases	229	7 577	1 822
Criminal cases	248	7 209	1 870
Court matters	157	5 187	1 190



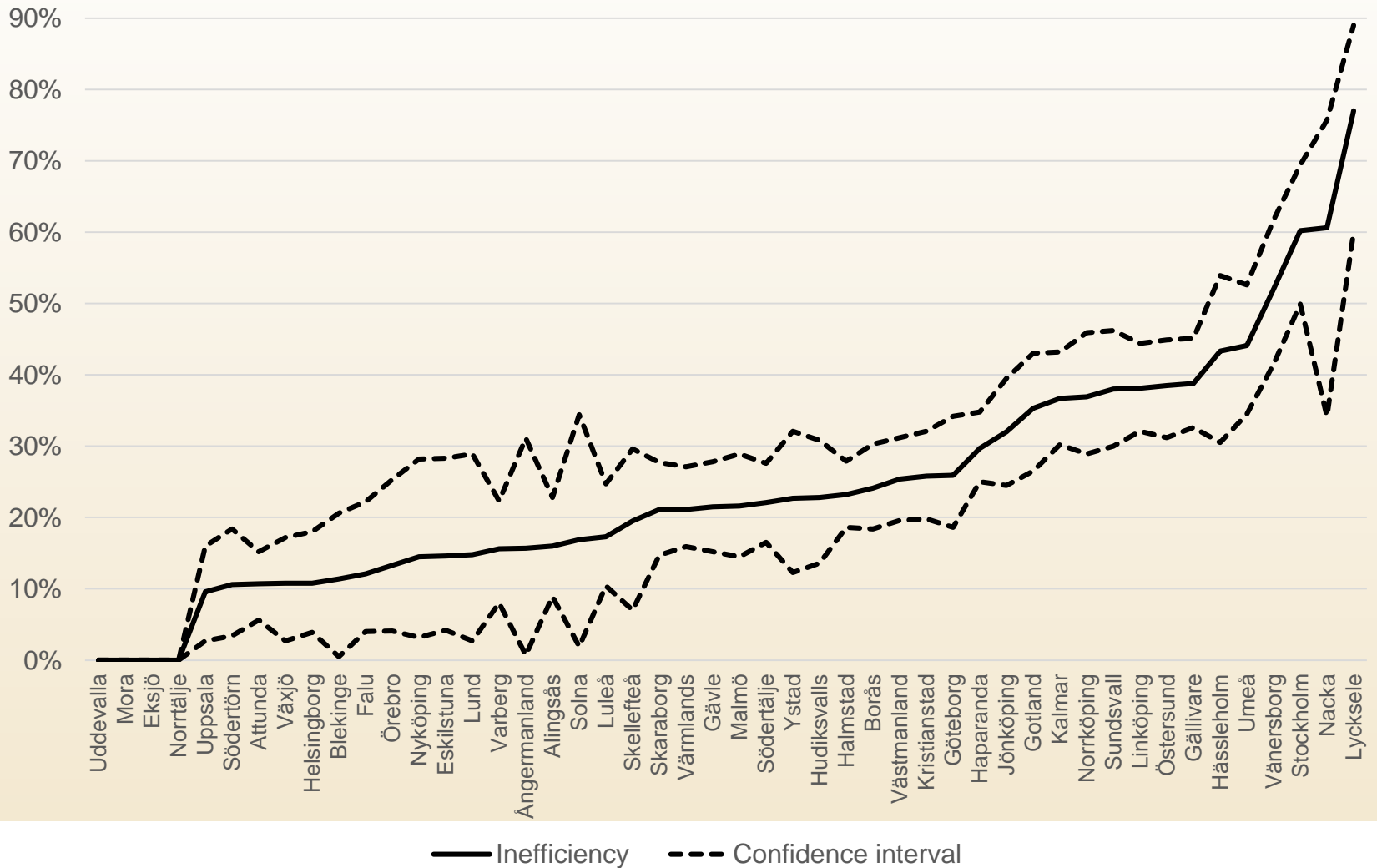
Efficiency results

	2012	2013	2014	2015	Mean 2012–2015
Mean inefficiency	24,4 %	11,4 %	8,9 %	9,6 %	10,7 %
Median inefficiency	21,6 %	10,0 %	6,8 %	6,6 %	–
Maximum inefficiency	77,0 %	33,5 %	39,1 %	37,0 %	–
Number of efficient units	4 (8 %)	12 (25 %)	15 (31 %)	22 (46 %)	–





Efficiency scores for 2012

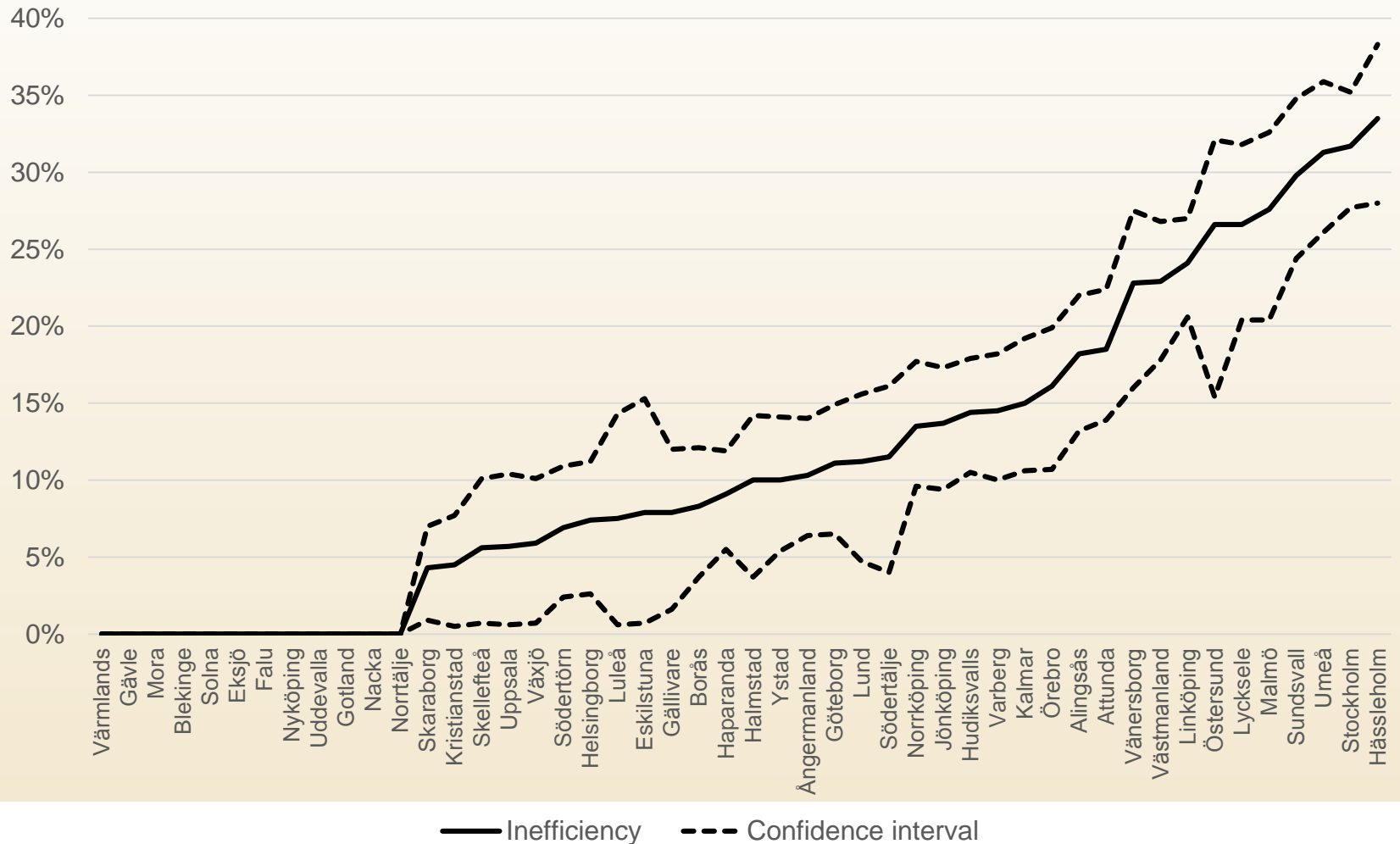


— Inefficiency - - - Confidence interval





Efficiency scores for 2013

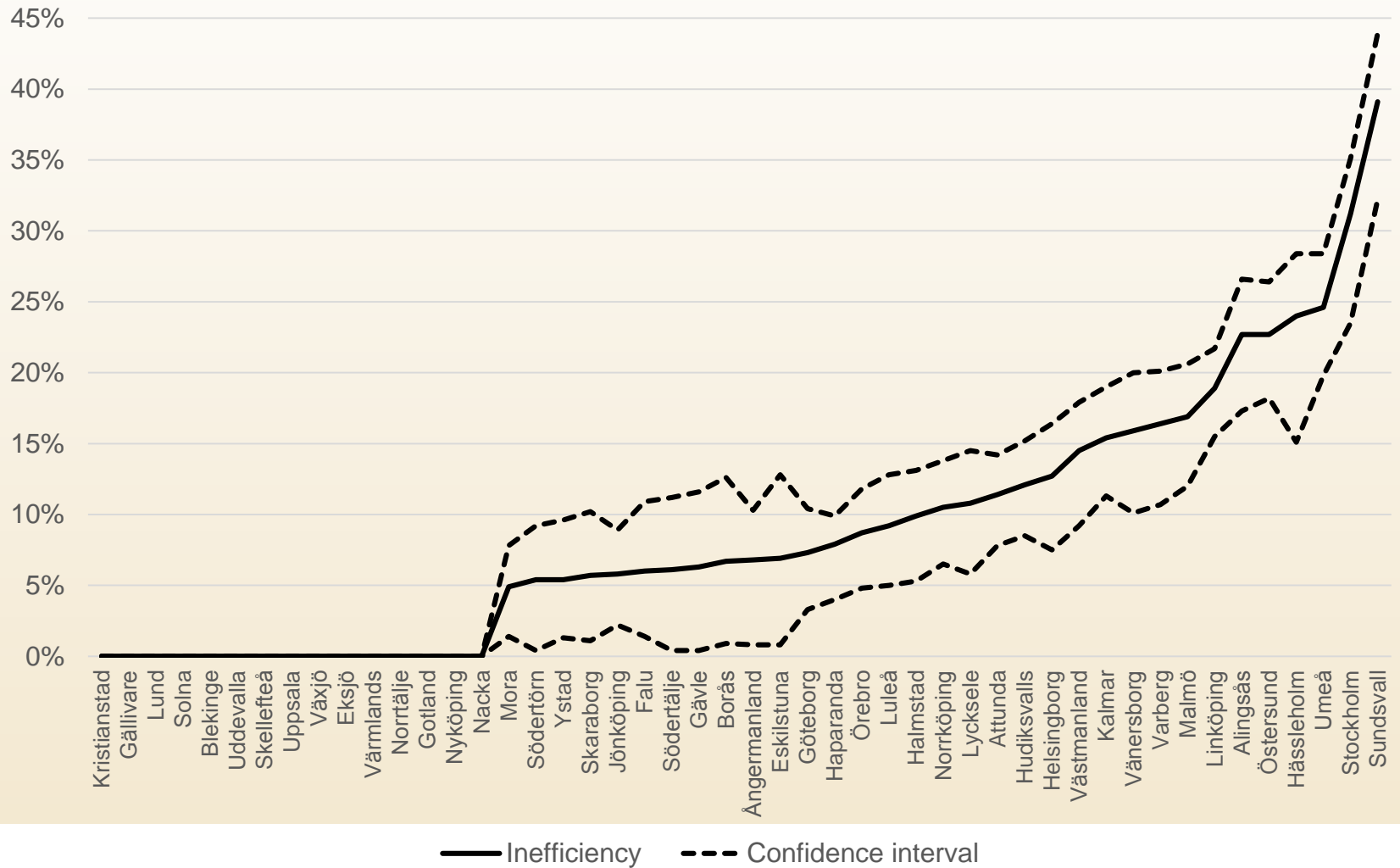


— Inefficiency - - - Confidence interval



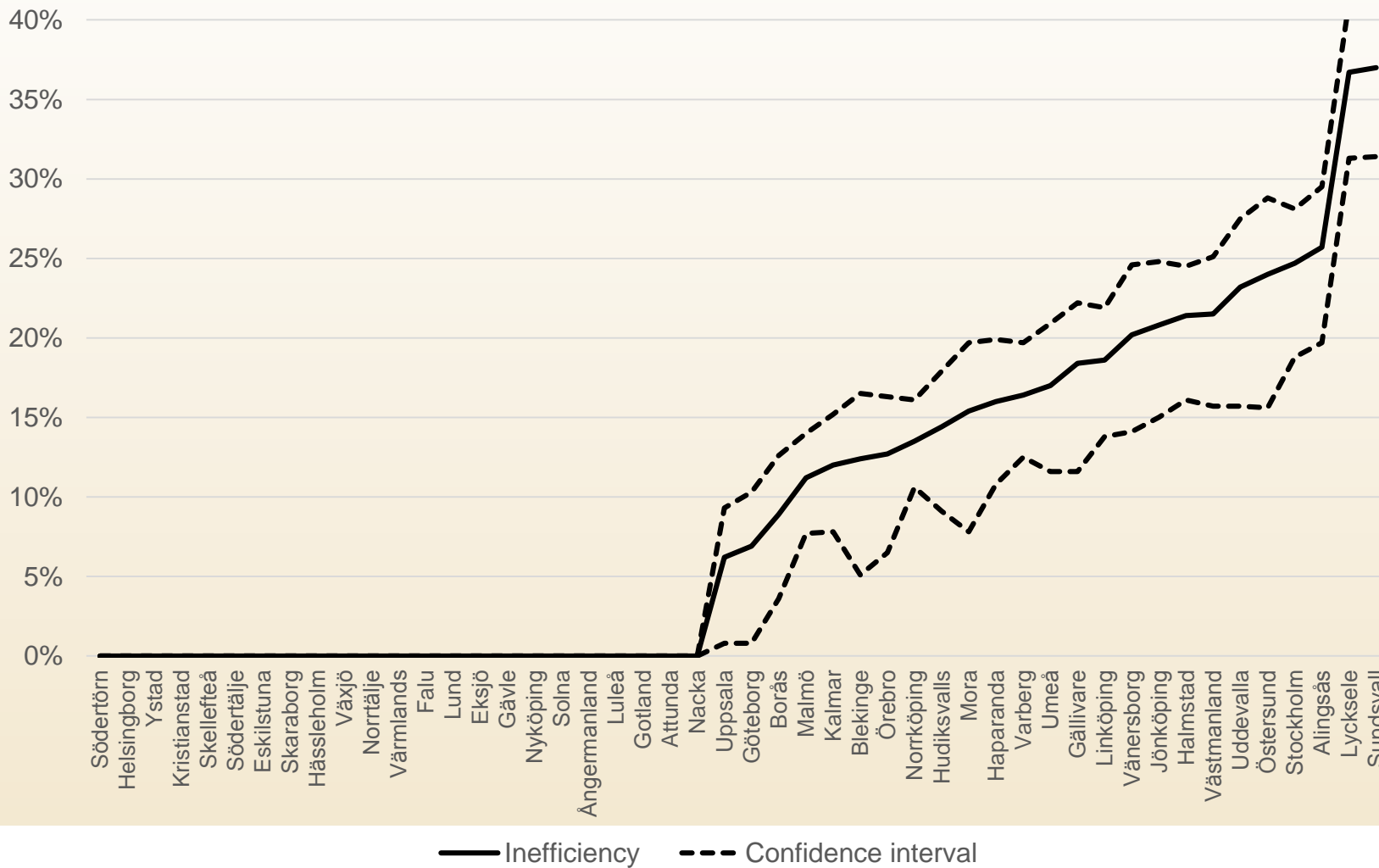


Efficiency scores for 2014

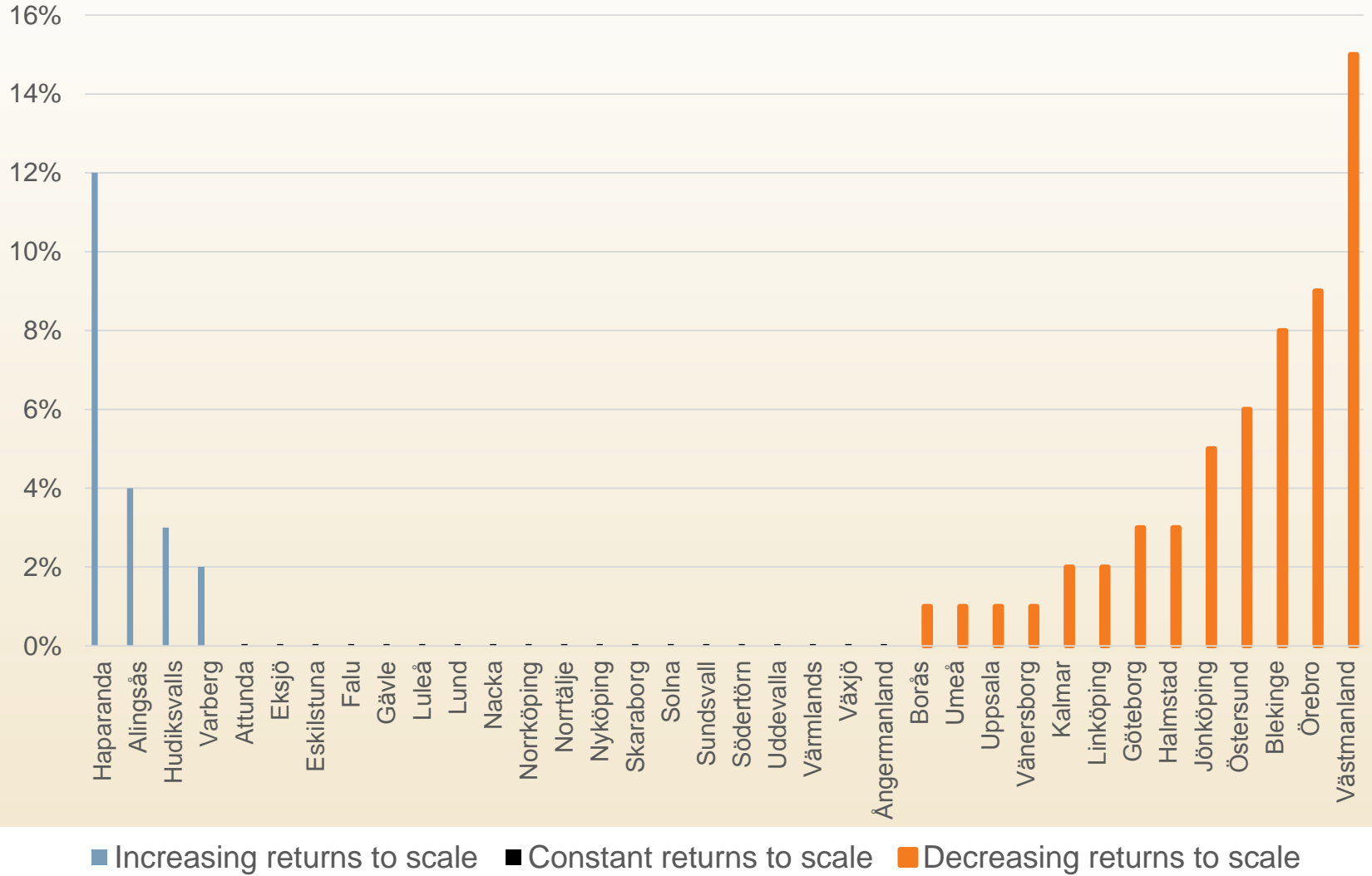




Efficiency scores for 2015



Scale efficiency 2015



■ Increasing returns to scale ■ Constant returns to scale ■ Decreasing returns to scale



Second-stage analysis – correlations with the efficiency scores

Variable	Efficient	Inefficient	Difference	Correlation coefficient	p-value
Staff turnover	9.2 %	12.1 %	2.9	0,10	0,18
Trainees (percent)	34.8 %	34.6 %	-0.2	-0.03	0.67
Amendment frequency in superior courts	0.992	0.993	-0.001	-0.13	0.07
Caseload	0.34	0.38	0.04	0.28*	0.00
Turnaround times	135	144	9	0.19*	0.01



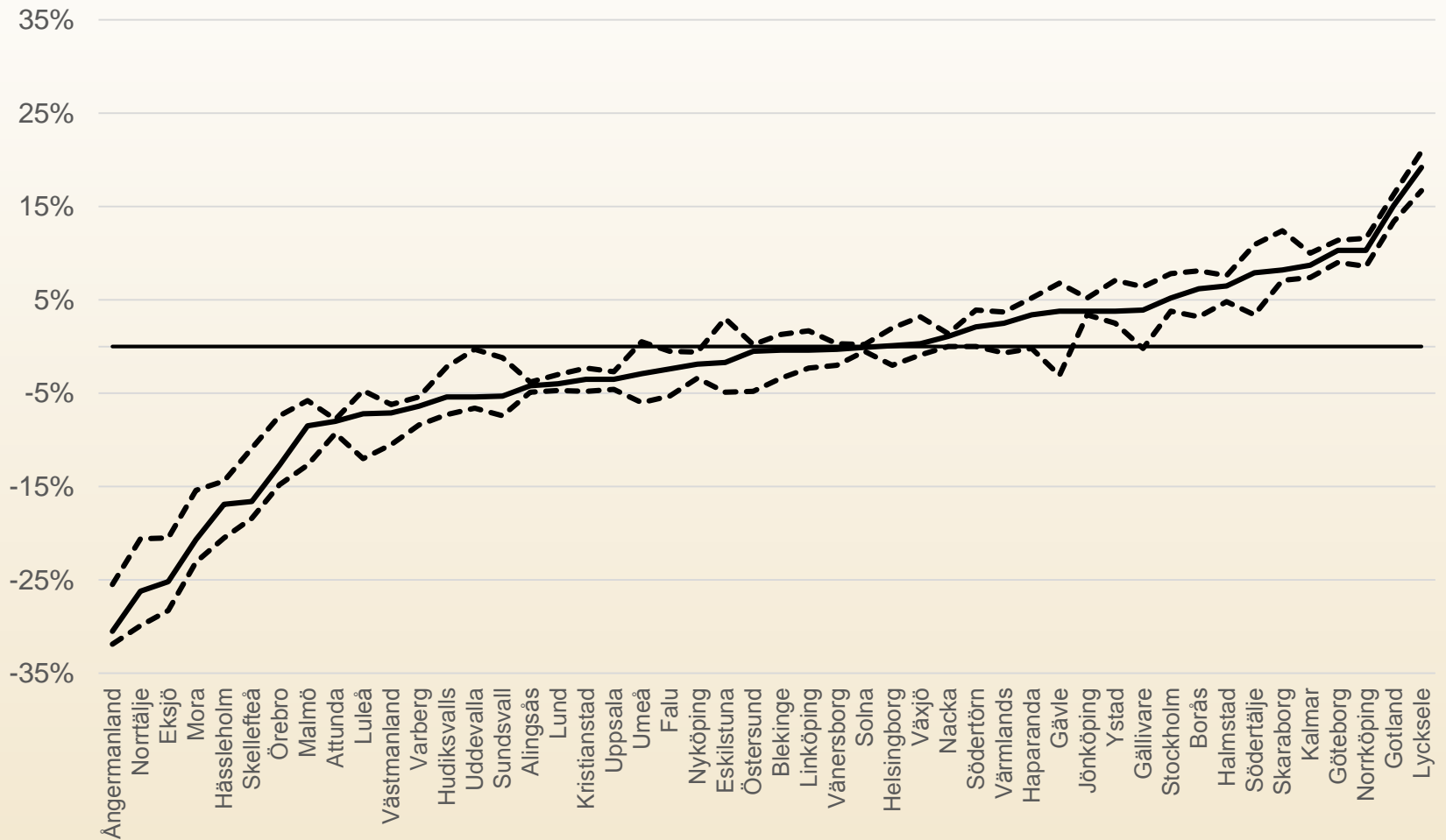


Productivity results

	2012-2013	2013-2014	2014-2015	Average 2012-2015
Productivity change	-2.4%	-0.5%	-3.6%	-2.1%
Efficiency change	6.2%	1.3%	-1.7%	1.9%
Technological change	-7.2%	-2.3%	-0.9%	-3.4%



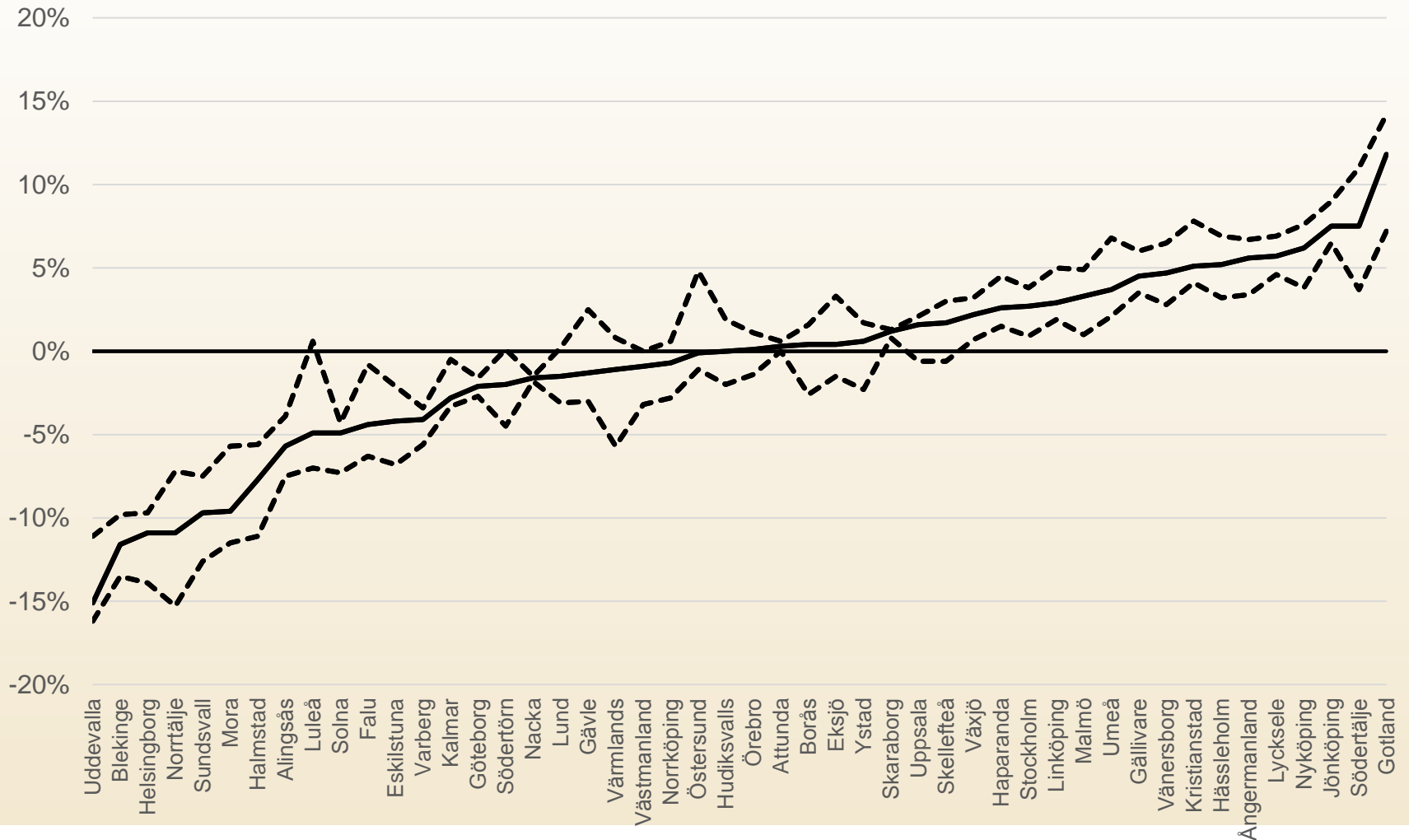
Productivity change 2012/2013



— Productivity change (percent) - - - Confidence interval



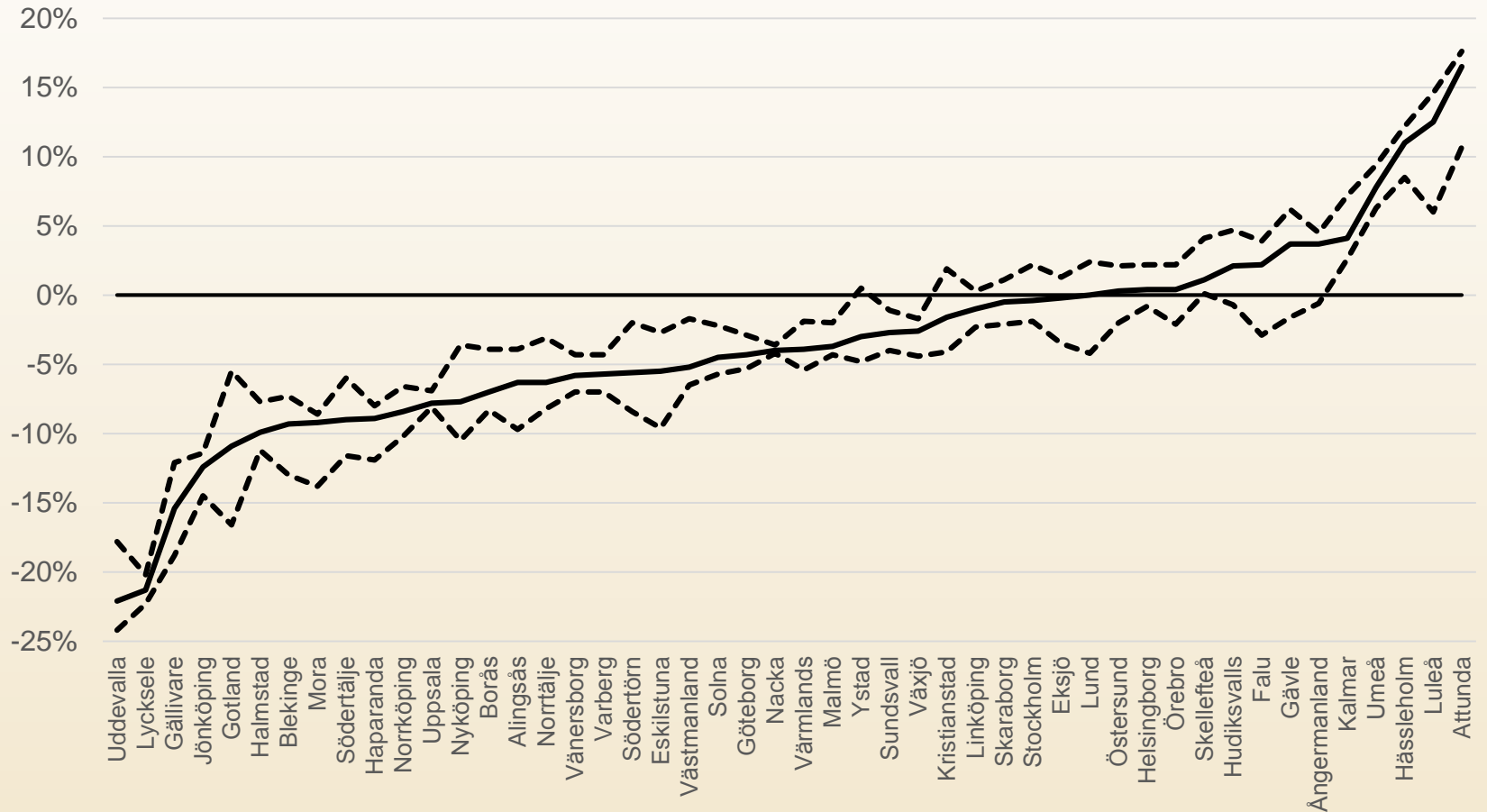
Productivity change 2013/2014



— Productivity change (percent) - - - Confidence interval



Productivity change 2014/2015



— Productivity change (percent) - - - Confidence interval





Conclusions

- › Stable inefficiency scores over time
 - Some courts could make large improvements

- › Some scale inefficiencies exist
 - Mostly decreasing returns to scale are found but also increasing returns to scale for some district courts

- › Negative productivity development
 - The total factor productivity is measure using the Malmquist index and is found to be decreasing with around 2 percent per year





Conclusions (continued)

- › Second stage analysis does not find any relation between efficiency scores and...
 - Staff turnover
 - Percentage trainees
 - Amendment frequency in superior courts

- › However finds a positive correlation with efficiency and...
 - Caseload
 - Turnaround times





Recommendations

Based on the audit findings, the Swedish NAO made the following recommendations:

- › The National Courts Administration, in its work to improve efficiency, should take into account that some districts courts are assessed as being more efficient than others, and therefore general measures to improve efficiency directed at all district courts are not necessarily appropriate
- › The National Courts Administration and the district courts should identify factors that influence efficiency and productivity. This work should map both the factors that the district courts can influence (internal) and factors that they cannot influence (external)
- › In its reporting of productivity, the National Courts Administration should use measurements that take into account the entire production as a complement to the partial measurements used today

