

Farmer feedback - benchmark reports and R

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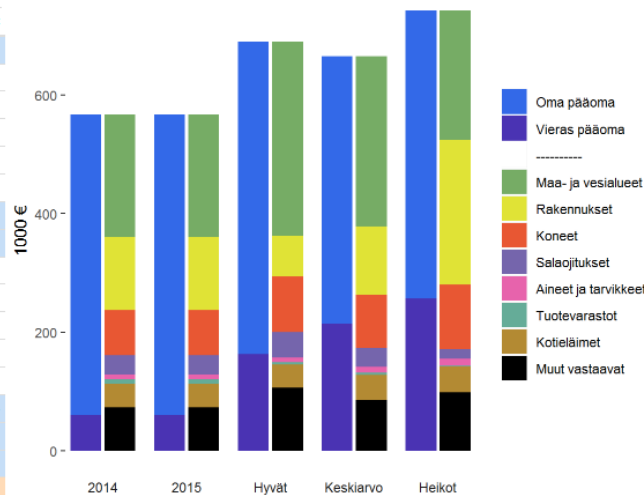
Outline

1. Background on the benchmark report
2. The overhaul of the system – causes and consequences
3. Creating the content of the report
4. Putting the pieces together
5. From server to farmer
6. The future of the system

What is the benchmark report?

- Farmers participating in FADN data collection in Finland receive a couple of different feedback reports
- One of these is the benchmark report, where the farm is compared to other similar farms
- The report also includes time series for comparisons to own past performance
- Comparisons of e.g. key financial figures and indicators, land use, working hours...

Vastaavaa 31.12.	Yritys		Vertailuryhmä		
	2014	2015	Hyvät	Keskiarvo	Heikot
Aineettomat hyödykkeet	18 041	18 041	0	1 032	1 323
Maa- ja vesialueet	205 895	205 895	328 847	288 521	218 032
Rakennukset ja rakennelmat	124 382	124 382	88 571	115 308	243 893
Koneet ja kalusto	78 055	78 055	94 231	89 461	108 456
Salaojitukset	31 820	31 820	43 130	32 422	16 488
Muut aineelliset hyödykkeet	7 520	7 520	0	109	542
Aineelliset hyödykkeet	445 633	445 633	532 778	523 819	587 381
Pitkäaikaiset sijoitukset	12 856	12 856	61 339	38 198	45 088
Aineet ja tarvikkeet	7 413	7 413	7 039	9 490	11 957
Keskeneräiset tuotteet	10 228	10 228	21 660	19 588	24 625
Valmiit tuotteet ja tavarat	7 846	7 846	3 798	4 475	1 000
Kotieläimet	40 940	40 940	39 610	42 094	43 711
Muu vaihto-omaisuus	0	0	0	0	0
Vaihto-omaisuus	66 227	66 227	72 106	75 644	81 254
Saamiset	7 001	7 001	18 730	22 346	18 665
Rahoitusomaisuus	16 934	16 934	4 285	4 181	8 275
Vastaavaa	566 713	566 713	689 238	665 221	741 986



Vastattavaa 31.12.

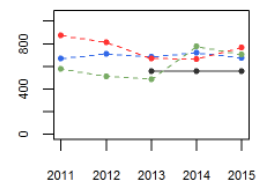
	2014	2015	Hyvät	Keskiarvo	Heikot
Oma pääoma	506 096	506 096	526 316	450 781	485 404
Investointien tasearvo	15 181	15 181	6 345	18 285	55 627
Vieras pääoma	60 617	60 617	162 922	214 439	256 582
Vastattavaa	566 713	566 713	689 238	665 221	741 986

Tunnusluvut, maa- ja puutarhatalous

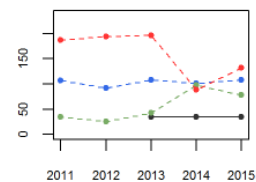
	2014	2015	Hyvät	Keskiarvo	Heikot
Yrittäjätulo	48 553	48 553	73 215	43 022	21 853
Kannattavuuskerroin	0,53	0,53	0,81	0,49	0,21
Työansio	15 575	15 575	52 069	23 451	-2 481
Työuntiansio, €/h	3,9	3,9	11,7	5,4	-0,5
Oman pääoman tuotto	17 019	17 019	17 713	9 255	4 886
Oman pääoman tuottoprosentti	3,4	3,4	3,4	2,1	1,0
Kokonaispääoman tuotto	-7 327	-7 327	8 718	-19 251	-50 028
Kokonaispääoman tuottoprosentti	-1,3	-1,3	1,0	-2,9	-6,5
Omanvaraisuusaste	89,3	89,3	76,4	67,8	65,4

Taseen ja velkaantuneisuuden kehitys

Vastaavaa, 1000€

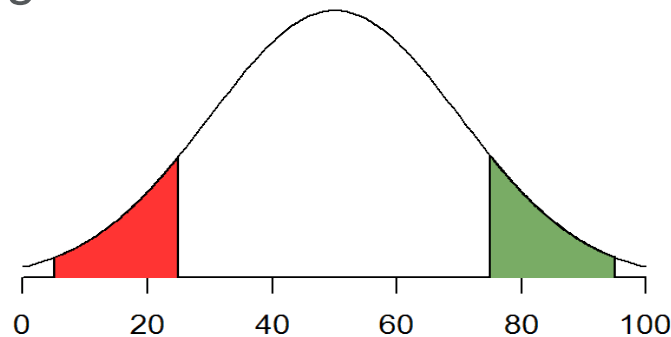


Suhteellinen velkaantuneisuus



The comparison groups

- Who do we compare to? Farms of the same production type, of the same size category, in the same area
- Within the comparison group, we have the "strong" and "weak" groupings, *usually* categorised by profitability ratio*
- Upper and lower bounds are not fixed! If the group doesn't have enough farms, the boundaries are expanded
- After this, if the number of farms is still too small, neighbouring regions are joined together



*Profitability ratio = $\text{FNI} / \text{opportunity cost of farm work and equity}$

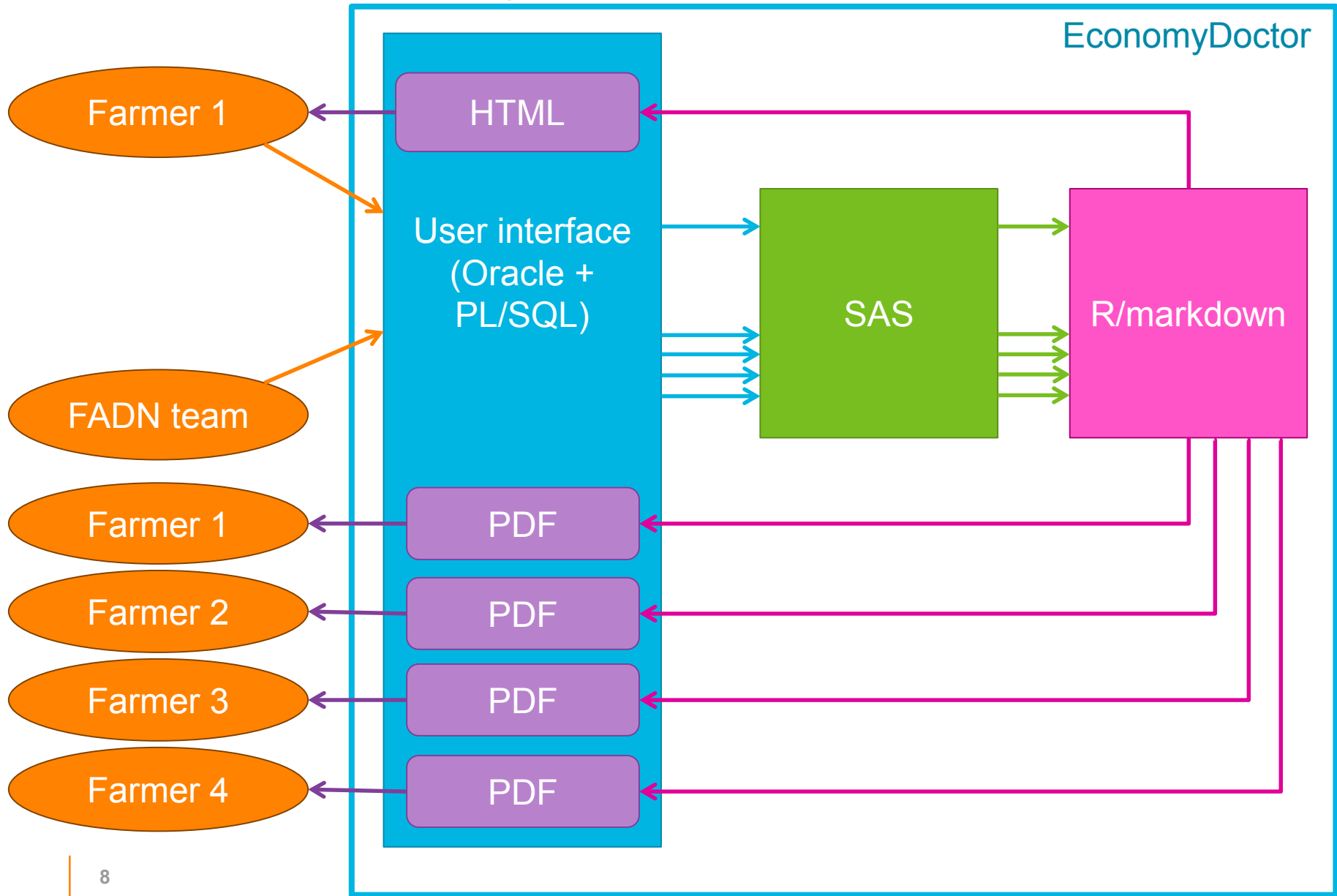
What's the point of a benchmark report?

- In a questionnaire sent out to participating farmers, about a quarter of respondents indicated that being able to compare their situation with other farms was their main reason for participating.
- The benchmark report is generally considered useful, and the farmers are satisfied with the report – both content and presentation.
- The visual nature of the report allows for quick comparisons, and the time series show development across a range of variables.

From VBA to EconomyDoctor

- We're remaking the system that produces the reports! Exciting!
- Why?
 - Reduce dependency on a single person in the team
 - Easier to make any changes to the report content and structure
 - Extend the system to produce dynamic reports to display on EconomyDoctor – as opposed to the current static system
- What are the challenges?
 - Keeping it similar enough in appearance and with the same information as the old version, while making it functional in R
 - Building the systems and loops that work together with R – calling the program, handing over the data, and getting out the final report

How does the new system work?



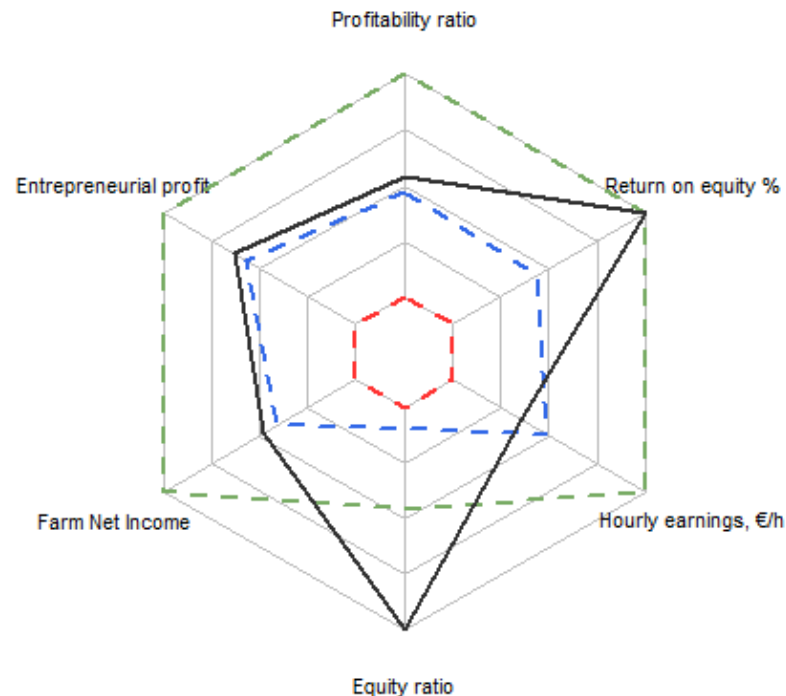
From SAS to R – data handling

- The data is exported from SAS into R, which first turns the file into a data frame object
- Before using the data to make the tables and figures, R does the following:
 - Sets options for how data is displayed (force penalty for scientific notation, hide NA values from tables)
 - Separates out the different categories (own farm, average, strong, weak)
 - Finds the year from the data
 - Uses the function *complete* from the **tidyr** package to add missing years with empty values (rows with NA rather than missing rows)
 - Finds the variable used to create the strong/weak groups as well as the group boundaries

Let's see some graphs!

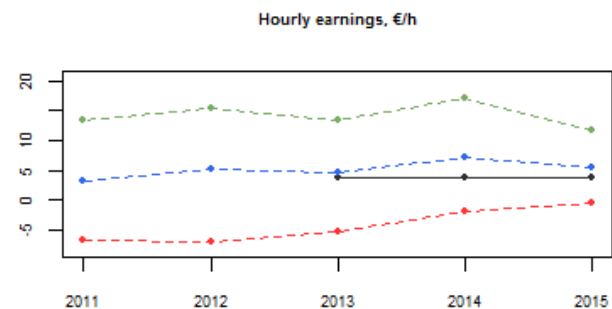
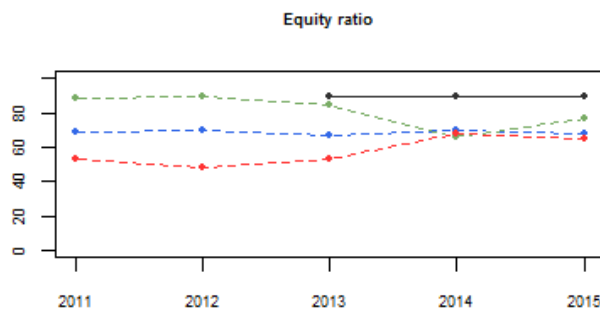
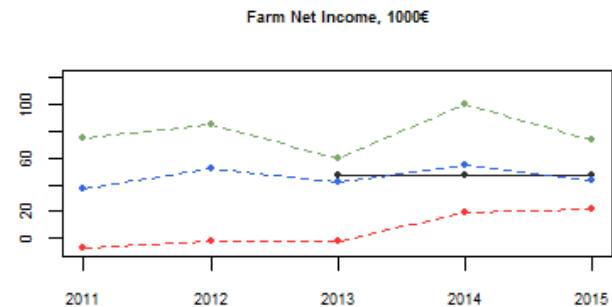
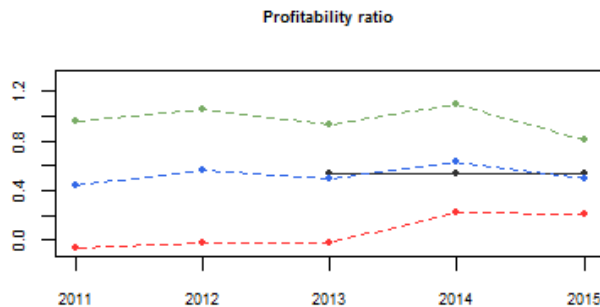
Radar chart

- R package: **fmsb**
- A quick way to see where the farm falls relative to the comparison groups
- By far the easiest graph to produce in the entire report



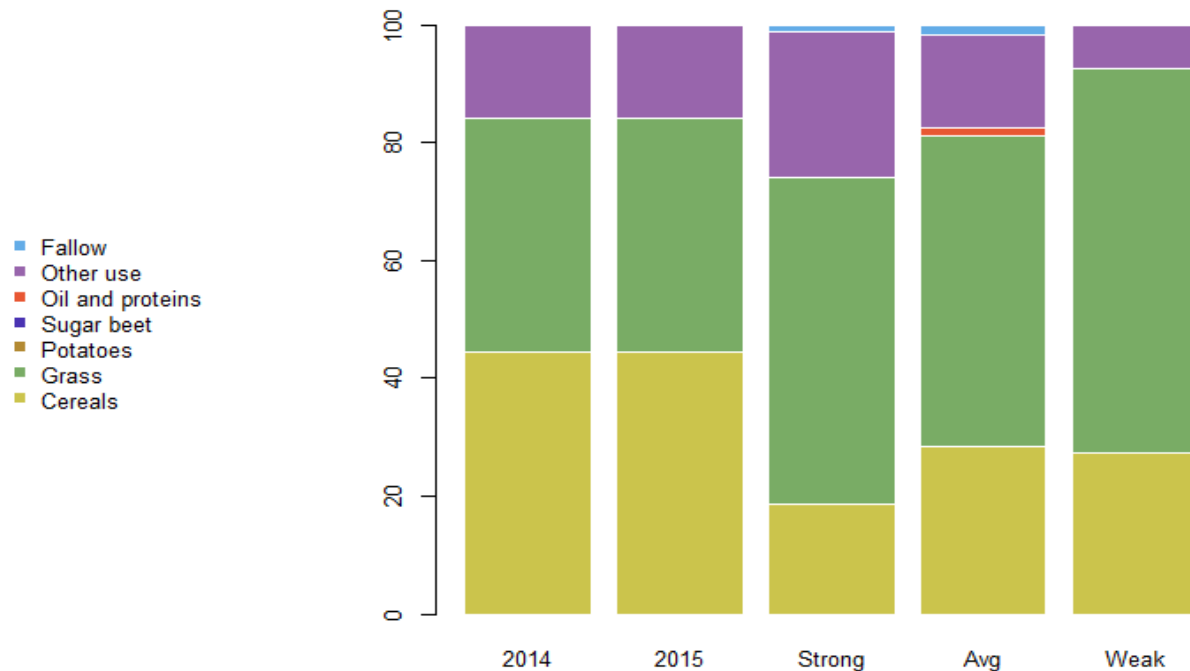
Time series

- Using the basic **graphics** package that comes with R
- Most are five-year time series; some ten-year time series in the report as well



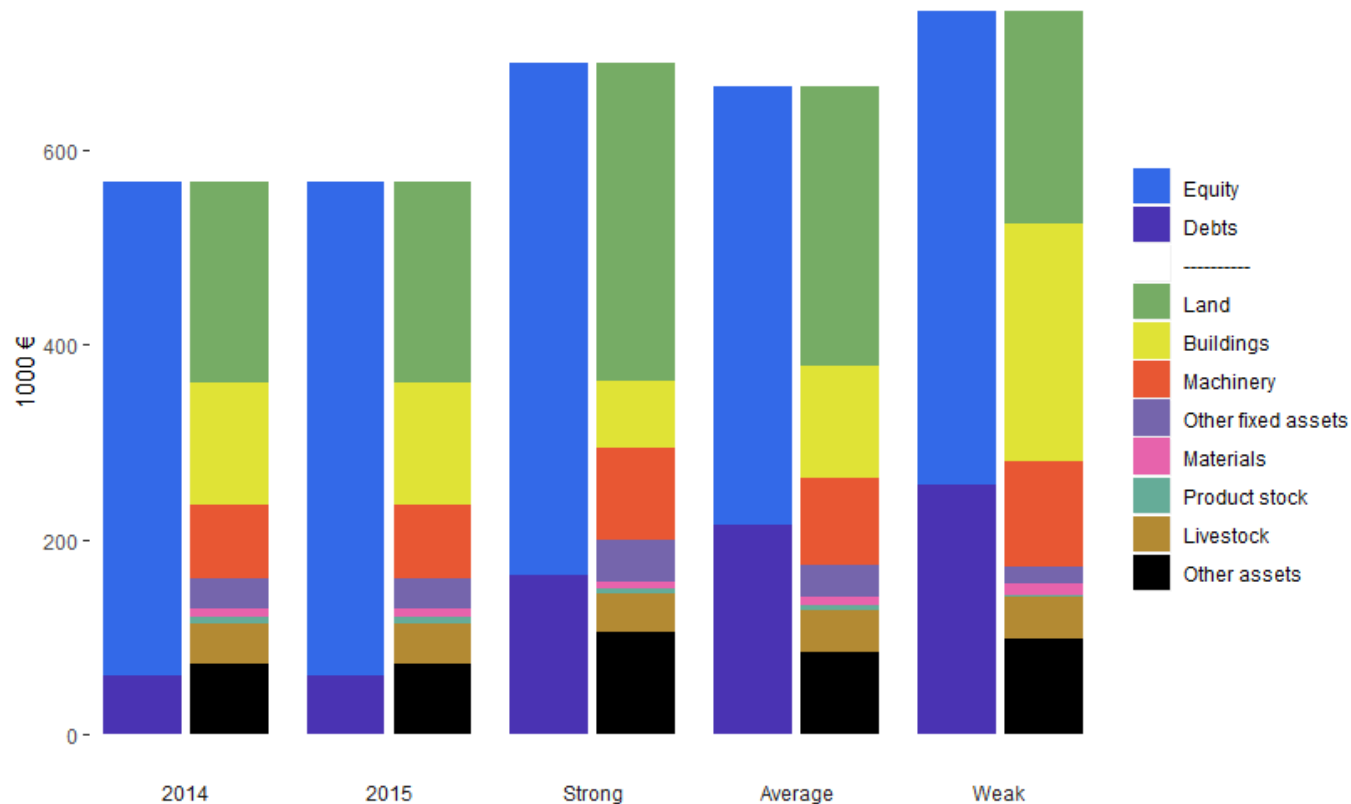
Bar charts, part 1

- The first two bar charts are made using the **graphics** package
- Instead of absolute numbers, these show percentages of a whole
- Graphs show a) arable land use, b) proportions of working hours by farm family and hired workers (not shown here)

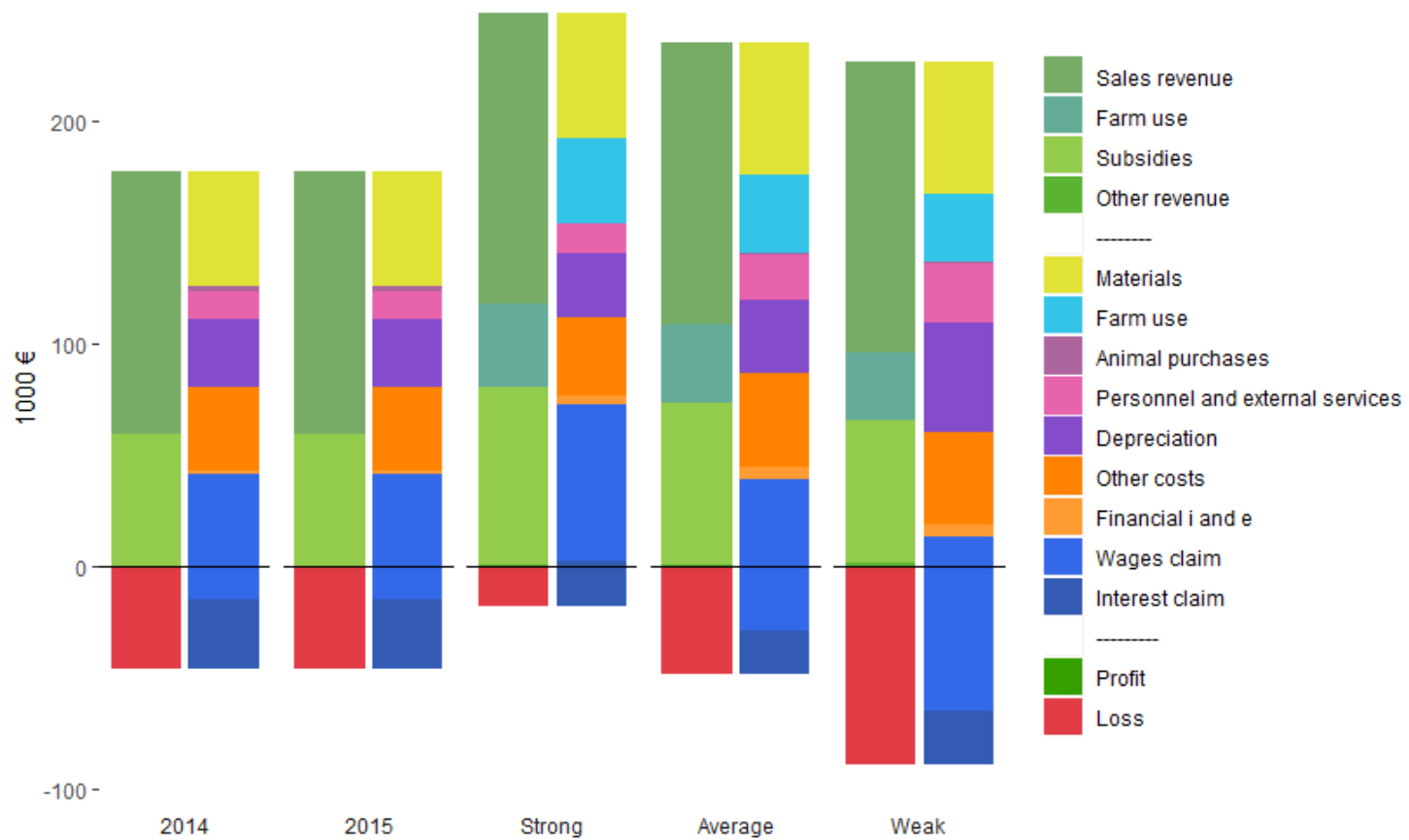


Bar charts, part 2

- The next ones use `ggplot2`, and these both show absolute numbers
- Why two different graphics packages? *graphics* is simpler to use, but *ggplot2* allows things like faceting, necessary for these plots



The more difficult ggplot to produce was the graph you see here – sinking the second bar below 0 required a ridiculous nested for/if else/if else –loop



Tables

- While the output of the graphs is an image, the tables in the document work slightly differently
- The tables are printed onto the document using the `kable`-function, and are edited using the `kableExtra`-package in R
 - Row colours
 - Indentations and row groupings
 - Text colour and style
 - Header rows

Yrittäjäperhe, h	Yritys		Vertailuryhmä			Palkattu henkilöstö, h	Yritys		Vertailuryhmä		
	2014	2015	Hyvät	Keskiarvo	Heikot		2014	2015	Hyvät	Keskiarvo	Heikot
Maatalous yhteensä	3 834	3 834	4 513	4 348	4 990	Maatalous yhteensä	271	271	0	244	34
Kasvinviljely	1 170	1 170	510	561	627	Kasvinviljely	81	81	0	137	26
Kotieläinten hoito	2 411	2 411	3 835	3 534	4 008	Kotieläinten hoito	190	190	0	86	8
Muu maatalouden työ	253	253	168	253	355	Muu maatalouden työ	0	0	0	20	0
Puutarhatalous yhteensä	183	183	0	0	0	Puutarhatalous yhteensä	0	0	0	0	0
Tuotanto	75	75	0	0	0	Tuotanto	0	0	0	0	0
Markkinointi	0	0	0	0	0	Markkinointi	0	0	0	0	0
Muu puutarhatalouden työ	108	108	0	0	0	Muu puutarhatalouden työ	0	0	0	0	0
Työpanos yhteensä	4 017	4 017	4 513	4 348	4 990	Työpanos yhteensä	271	271	0	244	34

title: "Benchmark report"

output:

flexdashboard::flex_dashboard:

logo: [lukelogo.png](#)

css: [luke.css](#)

```
```${r setup}
library(knitr)
library(flexdashboard)
options
data <- read.file("benchmarkdata.file")
deal_with(data)
```
```

Page 1

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Column {data-width=450}

```
```${r}
table1 <- select(data, variables)
kable(table1)

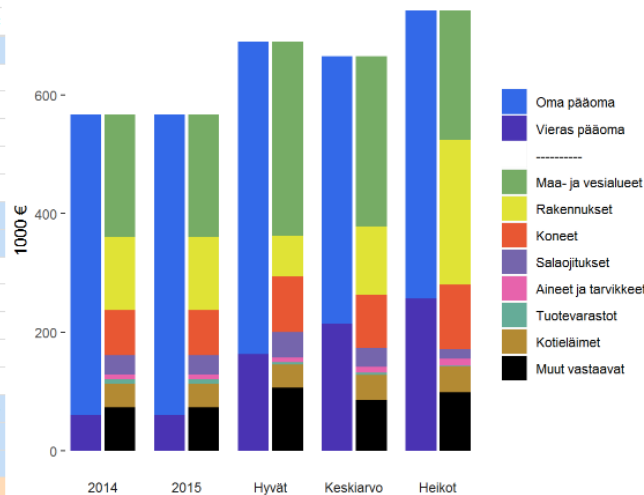
graph1data <- select(data, variables)
plot(graph1data)
```
```

How does R-markdown work?

When "knitting" the report:

1. **R-code chunks** are evaluated first
2. Markdown is then used to build a frame around the output from R
 1. **knitr** creates the basic document structure
 2. **flexdashboard** arranges it into columns and rows, and adds a navigation header
3. The output (a pandoc document) is converted into a HTML document with **custom CSS** and **header logo** applied
4. A beautiful document comes to life!

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| Kotieläimet | 40 940 | 40 940 | 39 610 | 42 094 | 43 711 |
| Muu vaihto-omaisuus | 0 | 0 | 0 | 0 | 0 |
| Vaihto-omaisuus | 66 227 | 66 227 | 72 106 | 75 644 | 81 254 |
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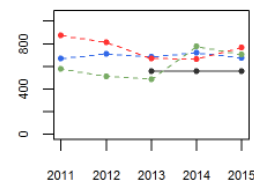
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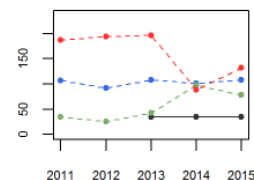
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|---------------------------------|--------|--------|--------|-----------|---------|
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| Kannattavuuskerroin | 0,53 | 0,53 | 0,81 | 0,49 | 0,21 |
| Työansio | 15 575 | 15 575 | 52 069 | 23 451 | -2 481 |
| Työuntiansio, €/h | 3,9 | 3,9 | 11,7 | 5,4 | -0,5 |
| Oman pääoman tuotto | 17 019 | 17 019 | 17 713 | 9 255 | 4 886 |
| Oman pääoman tuottoprosentti | 3,4 | 3,4 | 3,4 | 2,1 | 1,0 |
| Kokonaispääoman tuotto | -7 327 | -7 327 | 8 718 | -19 251 | -50 028 |
| Kokonaispääoman tuottoprosentti | -1,3 | -1,3 | 1,0 | -2,9 | -6,5 |
| Omanvaraisuusaste | 89,3 | 89,3 | 76,4 | 67,8 | 65,4 |

Taseen ja velkaantuneisuuden kehitys

Vastaavaa, 1000€



Suhteellinen velkaantuneisuus



The future of the benchmark report

- Maps!
- Dynamic reports for EconomyDoctor where the user can choose which variable to use for creating the strong/weak groupings
- New indicators – policies and data collection needs change, and the benchmark report changes with them
- Similar dashboards are also being made for reindeer husbandry and possibly in the future fisheries and aquaculture
 - There's been interest from others in the Statistical Services unit, so who knows what statistics we'll end up using dashboards for
 - Dashboards to take over the world? It's more likely than you think!

Thank you!

