Organisation for Economic Co-operation and Development

DSTI/CDEP/MADE(2017)3

For Official Use **English - Or. English**

30 October 2017

DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INNOVATION
COMMITTEE ON DIGITAL ECONOMY POLICY

Working Party on Measurement and Analysis of the Digital Economy

Measuring Digital Maturity in Firms

2-3 November 2017, OECD Headquarters, Paris.

This document, prepared by Irene Ek of the Swedish Agency for Growth Policy Analysis (Growth Analysis), summarises the main findings of the study "Digital Maturity in Sweden" prepared for the Swedish Ministry of Enterprise, Energy and Communications in 2017. The study analyses digital maturity in Swedish firms and discusses how the analysis can support evidence-based policies in the digital economy.

Actions Required: The Working Party is invited to discuss the presentation and provide guidance on next steps.

The document is a contribution to IO 2.1.a " Developing the framework to analyse, measure and assess digitalisation " of the 2017-18 Programme of Work of the CDEP.

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Contact: Irene EK; email: Irene.Ek@tillvaxtanalys.se;
Vincenzo SPIEZIA; email: Vincenzo.Spiezia@oecd.org

JT03421886

Digital maturity in Sweden

Policy brief

Irene Ek

Calculations and method appendix provided by Barbro Widerstedt

growth analysis

Our ref: 2016/106

Swedish Agency for Growth Policy Analysis
Studentplan 3, SE-831 40 Östersund, Sweden
Telephone: +46 (0)10 447 44 00
Fax: +46 (0)10 447 44 01
E-mail: info@growthanalysis.se
www.growthanalysis.se

For further information, please contact: Irene Ek
Telephone: +46 10 447 77 79
E-mail: Irene.ek@growthanalysis.se

Background

This document, prepared by Irene Ek[1] of the Swedish Agency for Growth Policy Analysis (Growth Analysis), summarises the main findings of the study "Digital Maturity in Sweden" prepared for the Swedish Ministry of Enterprise, Energy and Communications in 2017. The study analyses digital maturity in Swedish firms and discusses how the analysis can support evidence-based policies in the digital economy.

In 2016 the Swedish Ministry of Enterprise, Energy and Communications asked Growth Analysis to analyse the digitalisation of the Swedish economy. The Swedish Ministry requested that the analysis should contribute to the implementation of the strategy "Smart industry – a strategy for new industrialisation for Sweden" (Ministry of Enterprise and Innovation, 2016). To guide the implementation of the strategy, the Ministry needed to know which sectors have achieved a higher level of digital maturity and which sectors are less mature.

Finally, the Ministry requested a multi-method approach based on statistics and case studies. The first part is based on a quantitative indicator, and presents the latest findings on digital intensity. The second part, is based on qualitative case studies, and illustrates transformation management intensity (see figure 1).

The pace of technological change is accelerating

The on-going digitalisation of the Swedish economy holds many promises to spur innovation, generate efficiencies, and improve services, thereby boosting productivity and economic growth. However, these benefits are accompanied by disruptions (Acemoglu & Autor, 2011; Adermon & Gustavsson, 2015). Digitalisation transforms the way companies do business and it changes the nature and structure of organisations and markets, raising important issues around digital maturity.

Digitalisation has transformed the world of business in the last 15 years (Brynjolfsson & McAfee, 2014). New Internet-based businesses have been born, such as the Internet-based communications company Skype and the music streaming service Spotify. However, the transformation encompasses much more than the traditional ICT-producing sector. The new technology is transforming many existing industries, including manufacturing, industry support services, transport, and retail (Growth Analysis, 2014).

Advances in digital technologies are embedded in all sectors of the economy and contribute to:

- improving productivity
- reaching new markets
- reducing costs
- changing business processes
- creating new business opportunities and new jobs.

Digital technologies can raise productivity, but the technologies are diverse and they are being adopted and diffused at different rates (Cardona, Kretschmer, & Strobel, 2013). Today, technological changes occur in a time span that is highly compressed compared

[1] Calculations and method appendix is provided by a colleague at Growth Analysis Mrs Barbro Widerstedt.

with the rate of change in the past. New technologies develop and mature much faster and more profoundly than they used to. The rapidly developing digital technologies – among them social media, the Internet of things, big data analytics, and cloud storage – enable unprecedented levels of connectivity for businesses worldwide. To prosper in this new connected environment, new capabilities are required that challenge established norms and blur traditional organisational boundaries.

The transition towards a digital economy is changing the way companies do business. Executives in every sector face a large array of digital opportunities. To understand the structural impact of digital technologies and the changing nature of competition in the digital economy, it is important to consider the digitalisation journey that Swedish industry has embarked on. To better understand the deepening impact of digital technologies, Growth Analysis suggests a digital maturity indicator (Growth Analysis, 2017).

G. Kane (2017) argues that the most common understanding — that digital transformation is about the implementation and use of cutting-edge technologies — is likely misguided. It is not hard to find a company that has implemented a new digital tool just to have it. When digital tools remain unused by employees the company is unable to deliver the intended transformation to the business. Digital transformation is about organisations using technology to do business in new and different ways (G. Kane, 2017). Still, building on Kane, it could be argued that if policymakers and company managers shift their thinking from a focus on digital transformation to a focus on digital maturity, they may find a number of benefits in understanding organisations that seek to adapt to an increasingly digital competitive environment (G. C. Kane, Palmer, Phillips, & Kiron, 2015).

A new digital maturity indicator to measure the on-going digitalisation of the Swedish economy

There is a need to develop indicators that can show how far businesses in different sectors have progressed in the digital transformation journey, i.e. how digitally mature they are.

This brief represents the first attempt to measure the ongoing digitalisation of the Swedish economy at the sector level and with regard to business size (Growth Analysis, 2017). The digital maturity indicator combines four components to provide a comprehensive picture of how digitally mature Swedish companies are.

The four components are:

- systems for enterprise resource planning (ERP)
- systems for customer resource management (CRM)
- social media
- market and integration (systems for e-invoice, e-sales, and supply chain).

As shown in table 1, the digital maturity indicator reveals which parts of the economy are surging ahead and which could be part of the next wave of growth. ICT, retail, other services, and manufacturing have achieved a higher level of digital maturity, while sectors such as construction, real estate, and transport are less mature.

- **ICT**: This sector is unique in its broad use of digital technology and its growing importance for all sectors across the economy. The benefit of a strong ICT sector is that digital competence can spill over to ICT-using sectors. The ICT sector is one of the fastest-growing sectors in Sweden, and this leads to quality improvements,

efficiency gains, and structural transformations throughout the economy as well as in the public sector.

- **Retail:** This sector is dynamic and developing quickly. Digitalisation creates new forms of retail and underpins retail facilitation. E-commerce is growing, and wholesale trade is seeing efficiency gains. In addition, the lines between the different stages of retailing are becoming increasingly blurred.
- **Other services**: The weight of the service sector's contribution to the economy is substantial because it is in this sector that most new jobs are created. The digital maturity of this sector is quite high despite its heterogeneity, encompassing advanced knowledge-intensive services as well non-technological activities in cleaning companies.
- **Manufacturing**: Global competition in this sector has intensified in recent years, and advanced manufacturing is becoming a strategic priority for many governments. Digitalisation underpins trade facilitation and global value chains. It enables products to be connected or value creation conducted nearly anywhere, raising issues about the global nature of production. In addition, new technologies are reshaping the characteristics of the manufacturing of goods and services, and production processes and customer relations are being digitalised.

Table 1. Digital maturity by sector and user component

	ERP systems	CRM systems	Market & integration	Social media	Overall digital maturity
Industry (1)					
Information and communication	0,54	0,52	0,25	0,34	0,34
Wholesale and retail trade	0,63	0,53	0,32	0,11	0,25
Other services	0,54	0,44	0,17	0,16	0,22
Manufacturing	0,72	0,37	0,23	0,09	0,20
Utilities	0,47	0,35	0,17	0,12	0,19
Accommodation and food services	0,47	0,34	0,24	0,06	0,16
Real estate activities	0,59	0,40	0,11	0,08	0,14
Transport and storage	0,50	0,15	0,28	0,03	0,12
Construction	0,45	0,17	0,14	0,04	0,10
ICT-sector (2)					
ICT-using sectors	0,72	0,55	0,35	0,27	0,37
ICT-sector	0,68	0,59	0,22	0,21	0,29

More digitally mature — Less digitally mature

Note: (1) The type firm is an enterprise with a turnover of 250 million SEK (approximately €25 million) and 100 employees when comparing the intensity of use of digital technologies between industries. The type firm is not part of a national or international enterprise group and does not employ ICT specialists. (2) The type firm is an enterprise with a turnover of 250 million SEK (approximately €25 million) and 100 employees. The type firm is not part of a national or international enterprise group but does employ ICT specialists.

Sources: Statistics Sweden: ICT usage in Enterprises 2014, Structural Business Statistics 2013, and the registry of enterprise groups 2013. Growth Analysis: International Enterprises 2013. Calculations by the author.

The indicator also contributes to the understanding of how far firms of different sizes have progressed in their digital maturity journey. Table 2 shows digital maturity in small, mid-sized and large firms. It demonstrates that small firms are lagging behind large firms. One possible reason could be that smaller firms might not have as much need for ICT as larger firms. Although Swedish policy makers have addressed the need to support ICT-usage (Government appointed commission, 2012) in small firms, the results suggest that the rationale for policy action in this area still remains.

Table 2. Digital maturity by firm size and user component

Size	ERP systems	CRM systems	Market & integration	Social media	Overall digital maturity
Small firms	0,43	0,30	0,17	0,16	0,20
Mid-sized firms	0,71	0,51	0,31	0,28	0,35
Large firms	0,90	0,67	0,46	0,40	0,50

More digitally mature

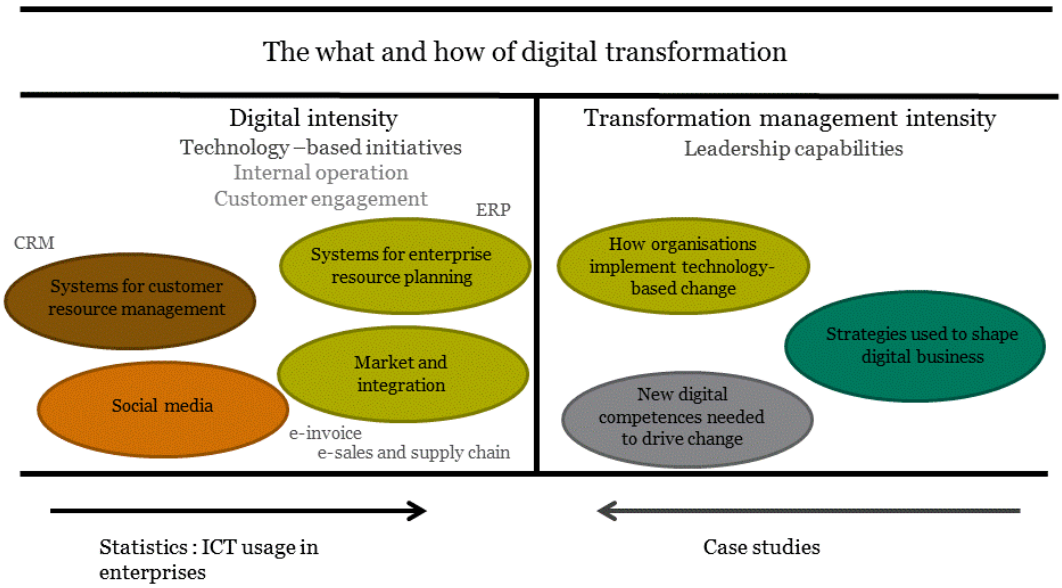
Less digitally mature

Sources: Statistics Sweden: ICT usage in Enterprises 2014, Structural Business Statistics 2013 and the registry of enterprise groups 2013. Growth Analysis: International Enterprises 2013. Calculations by the author.

Managing digital transformation

There is a need to complement the quantitative indicator with case studies in order to gain a deeper understanding of how far different businesses have progressed on their digital transformation journey, i.e. how digitally mature they are. Digital maturity is a combination of two separate but related dimensions (Growth Analysis, 2017). The first dimension is the previously presented digital maturity indicator that shows ICT usage in companies. Companies maturing in the second dimension, transformation management intensity, create the leadership capabilities necessary to drive digital transformation. Transformation management intensity consists of a) how organisations implement technology-based change, b) the strategies used to shape digital business, and c) the new digital competence needed to drive change (figure 1).

Figure 1. Digital maturity model



Source: Growth Analysis (2017) based on Westerman, Tannou, Bonnet, Ferraris, and McAfee (2012)

Digitally mature organisations understand how to use digital transformation to drive value. They combine transformative strategies and careful governance with sufficient investment

in new opportunities. However, in many companies, these elements are overly slow or conservative, preventing the company from investing in innovative opportunities.

The cases show that digital business is not just something that the organisations talk about in their strategies, and the informants described how the digital transformation affects all aspects of the operation.

The organisational changes include:

- ERP systems that digitise and connect processes for purchases, production, and sales
- Physical goods that are connected to the Internet and combined with services
- New digital business models that challenge the predominant business models

Drawing on the new case study evidence, it is clear that digital technologies are fundamentally transforming business strategies, business processes, and organisational capabilities. We observe how a number of companies embed their digital strategy into their overall business strategy. Drawing on the cases, we see three type of connection between digital strategy and the overall business strategy in which the connection is obvious, intensifying, or limited.

In addition, the results extend the existing literature on digital competence. The cases highlight that digital business requires new combinations of competences that extend beyond the technology-related competences described by the OECD in the report "Skills for a digital world". The Husqvarna case illustrates the need for agile competences that are less about technology and more about capabilities to organise and drive processes for rapid change. Sometimes change takes time in traditional sectors, and the manufacturer SKF demonstrates the new types of competences that are needed to connect different organisational functions. Broad competences are needed to connect the management, operational, and support processes that are required to understand how to drive value with digital transformation. The goal is not only to connect all machines in production, but also to offer services to manage the customer's operation remotely.

Policy implications

This brief is a stepping stone in highlighting to policymakers that they face a number of structural challenges that relate to digitalisation, and a better understanding of digitalisation will help to address these challenges. Conspicuous among these challenges are fears that technology will increasingly obviate the need for human labour, thus creating long-term unemployment and exacerbating income inequalities; the loss of manufacturing jobs to emerging economies; and worries that education systems might be inadequately responsive to the speed and scale of disruptive technological change.

Digitalisation is transforming the economy, and the primary beneficiaries will be those who adapt their capabilities and assets so as to fully exploit the potential of new technologies. The evidence presented in this brief supports the view that digitalisation reaches far beyond matters close to the state and highlights the need to accommodate digitalisation in other relevant policies such as industrial policy, innovation policy, labour-market policy, trade policy, education policy, and research policy (Growth Analysis, 2014, 2017).

How digitalisation drives economic growth and job creation is an increasing concern among governments, and policymakers thus face searching questions on how, and to what extent, the support of digitalisation contributes to economic growth and employment. Such

considerations highlight the challenge of improving the design and implementation of digitalisation policies. They also underscore the need to better understand how evidence should best inform the allocation of policy-related resources. The digital maturity report addresses this need and sheds light on which sectors are leaders and which have fallen behind. In addition, the report also informs policymakers on how digitally mature firms of different sizes are in Sweden. The results show that small firms, for example, are still lagging far behind larger firms.

The Swedish "Smart Industry Strategy" highlights the need to ensure that the benefits of digitally mature firms can be widely shared. To address this need, the "Digital maturity report" illustrates the transformation management capabilities of digital leaders. The report also highlights the importance of continued progress in policy learning. To strengthen the evidence base of digitalisation policy, Growth Analysis is currently mapping the policy mix for Industry 4.0, a major component of the Smart industry strategy. Emerging results indicate that in order to bridge the digital divide the policy mix should be developed so that it does not leave anyone behind. As the Smart industry strategy is currently being implemented, there are various support instruments designed to support digital leaders as well as digital laggards. Still, aligning political goals, the policy mix, and expected impacts is not an easy task and is an area that requires further analysis as well as policy attention.

Appendix: Method

In order to calculate the indicators for digital intensity, we used micro data from Statistics Sweden from the following statistical surveys: *ICT usage in Enterprises 2014 (Företagens användning av IT 2014)*, *Structural Business Statistics* (*Företagens ekonomi*) 2013, and the registry of enterprise groups (*Koncernregistret*). In addition, we also used micro data from the survey *International enterprises* (*Internationella företag*) produced by Growth Analysis.

The questions in the survey *ICT usage in Enterprises* that are used in the calculations are listed in Table 3. The questions are yes/no questions, where an affirmative answer is coded 1 and a "no" is coded 0.

Table 3. Questions in *ICT usage in Enterprises* that are used in the calculations of digital intensity

Question	Question No.	Partial indicator	Short name
Does your enterprise use an ERP software package? (Q20)	E1	ERP	erp
Does your enterprise use CRM software to manage the collection, storage, and making available information about customers to various business functions (Q21a)	E2a	CRM	crmstr
Does your enterprise use CRM software to manage the analysis of information about customers for marketing purposes. (e.g. setting prices, sales promotion, choosing distribution channels, etc.) (Q21b)	E2b	CRM	crman
Does your enterprise share supply chain management information electronically with its suppliers or customers? (Q23)	G1	MII	sisc
During 2013, did your enterprise receive orders for goods or services placed via a website? (Q29)	J1	MII	awsell
During 2013, did your enterprise place orders for goods or services via a website or EDI-type messages? (Q35)	J7	MII	aebuy
During 2013, did your enterprise receive orders for goods or services placed via EDI-type messages? (Q33)	J5	MII	axsell
Does your enterprise use any of the following social media?	C9	SM	
Social networks (e.g. Facebook, LinkedIn) (not solely used for paid adverts) (Q12a)	C9a		snet
Enterprise's blog or microblogs (e.g. Twitter) (Q12b)	C9b	SM	blog
Multimedia content sharing websites (e.g. YouTube) (Q12c)	C9c	SM	cntshr
Wiki based knowledge sharing tools (Q12d)	C9d	SM	wiki

Remark: Question numbers and translations are taken from the model questionnaire in the Community Survey on ICT usage and E-commerce in Enterprises for 2014. Question numbers in the Swedish questionnaire in parentheses.

Source: ICT usage in Enterprises 2014, Eurostat.

Other variables used in the calculations are presented in Table 4.

Construction of the indicator

The reply to each question is either yes (=1) or no (=0). The probability that a particular firm *j* replies yes $(Y_j = 1)$ to the a question is estimated with a probit

$$Y_j = \Phi(X_i\beta) + \varepsilon_i$$

Where X_i is a matrix of control variables for the firm. Among these are industry, turnover and whether the firm is part of a multinational enterprise group. The complete set of variables in the regression is listed in Table 4 and the full set of estimated probabilities can be found in Table 6.

From the probit estimation results we estimated the probability that a type firm in each of nine industries replied yes to the particular question. The probability that a type firm in industry *b* answers yes to question Y_j is calculated

$$P_b(Y_j = 1) = \Phi(\widetilde{X_1}\beta | B = b)$$

where P_b is the probability that a firm in industry (*b*) answers yes to question (*j*), given a particular set of other control variables.

Table 4 Control variables in the estimations

Variabel	**Description**	$\widetilde{X_1}$	$\widetilde{X_2}$
Industry	9 stratification levels		
Manufacturing	SNI 10-33		0,235
Utilities	SNI 35-39		
Construction	SNI 41-43		
Wholesale and retail trade	SNI 45-47		
Transportation and storage	SNI 49-53		
Accommodation and food service	SNI 55-56		
Information and communication	SNI 58-63		0,765
Real estate activities	SNI 68		
Other services	SNI 69-74, 77-82, 95.1		
ICT	Indicator variable, 1 if firm in ICT: SNI 26.1-26.4, 26.8, 46.5, 58.2, 61-62, 63.1, 95.1	0	1
iKoncern	Indicator variable, 1 if the firm is part of an enterprise group	0	0
iIntKoncern	Indicator variable, 1 if the firm is part of a multinational enterprise group	0	0
Ln_oms	Natural logarithm of firm turnover	12,53	12,53
Antanst	Number of employees	100	100
Itsp2	Indicator variable, 1 if the firm employs ICT specialists	0	1

Source: NACE Rev 2 and author's collation.

The type firm is an enterprise with a turnover of 250 million SEK (approximately €25 million) and 100 employees when comparing the intensity of use of digital technologies between industries. The type firm is not part of a national or international enterprise group and does not employ ICT specialists. The values are indicated in column $\widetilde{X_1}$ in Table 4.

We also compare the digital intensity in the ICT industry with the digital intensity in non-ICT firms within the same broad industries. The ICT industry is defined as a subsection of industries in *Manufacturing* and *Information and communication*. When comparing ICT-industries with other industries, the type firm is an enterprise with a turnover of 250 million SEK (approximately €25 million) and 100 employees. The type firm is not part of

a national or international enterprise group but does employ ICT specialists. The values are indicated in column $\widetilde{X_2}$ in Table 4. The indicator is calculated by

$$P_{IT}(Y_j = 1) = \Phi(\widetilde{X_2}\beta | IT = 1)$$

Index values by firm size are calculated from the estimated probability that a firm of a particular size (small, medium, large) answered yes to the particular question Y_j given the actual values of the control variables:

$$P_i(Y_j = 1) = \Phi(X_i\beta)$$

where X_i is the actual observed value of the control variables for firm *i*. The average probability that a firm in size class *s* answered yes to question Y_j is calculated by

$$P_s(Y_j = 1 | S = s) = \frac{\sum_{i \in s} \Phi(X_i\beta)}{n_s}$$

where P_s is the average probability that the firm in each firm size class answered yes to question Y_j and n_s is the number of firms in each firm size class. This means that the estimated digital intensity by firm size class depends in part on the structure of the industry, e.g. the average firm size.

The information for each variable is summarised into four partial indicators. These partial indicators reflect different aspects of the use of digital technology. Each indicator is a geometric mean of the estimated probability that a type firm in industry *b* uses a particular technology (P_b).The variables for the respective partial indicators are

1. ERP = (Ministry of Enterprise and Innovation),
2. CRM = {crman, crmstr},
3. MII = {sisc, awsell, aebuy, axsell},
4. SMI = {snet, blog, cntshr, wiki}

The overall indicator of digital intensity (DMI) is a geometric mean of all variables:

5. DMI = {erp, crman, crmstr, sisc, awsell, aebuy, axsell, snet, blog, cntshr, wiki}.

Each indicator D_i is calculated by

$$D_i = \left(\prod_{Y \in D}^{|D|} P(Y_j = 1 | \tilde{X}\beta) \right)^{\left(\frac{1}{|D|}\right)}$$

where Y_j is a variable in the indicator and $|D|$ is the total number of variables in the indicator. $\tilde{X}$ is a matrix of the values used for the control variables to represent the type firm ($\widetilde{X_1}$ or $\widetilde{X_2}$ depending on context).

Confidence intervals

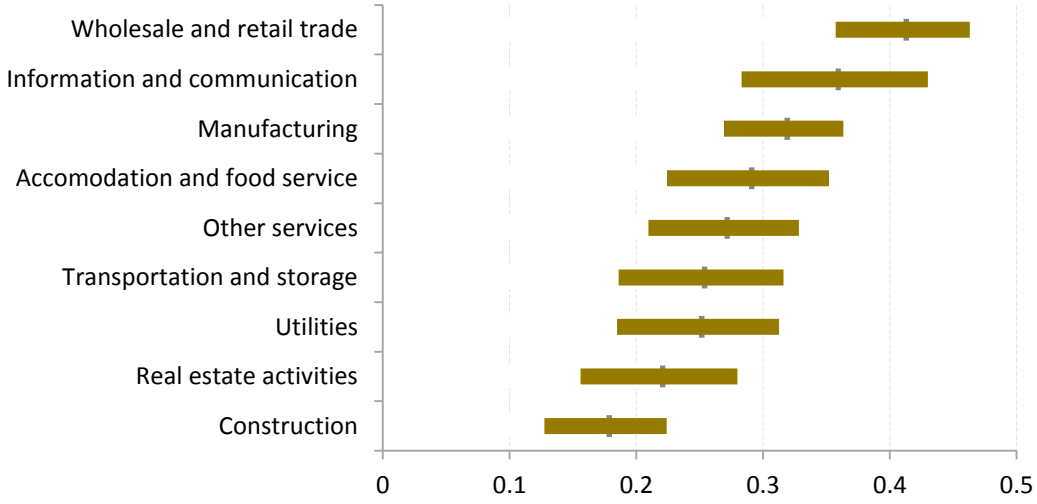
It should be noted that the estimated digital intensity for an industry or a firm size class is a point estimate on a sample of firms. This means that there is uncertainty about the "true" value. Rankings of (e.g.) industries based on these estimates are not straightforward and should be interpreted with caution. One way of dealing with this uncertainty is to calculate confidence intervals around the estimates.

The indices used in the main report are calculated using a univariate probit. This means that we do not consider that the usage of different technologies may be correlated. In order to calculate confidence intervals on the estimated probability of usage (P_b) and the corresponding partial indices we also did bivariate probit estimation for the partial index CRM and multivariate probit estimations for partial indices MII and SMI.[2] The multivariate version takes into consideration that the uses of different digital technologies are correlated. An example of this is that the decision to use CRM systems to collect and store information about customers (*crmstr*) might be correlated with the decision to use the same software to analyse information about customers for marketing purposes (*crman*).

This is illustrated in Figure 1 for a composite indicator for digital intensity that excludes social media variables. Note that this is *not* the overall indicator used in the main report.[3] The estimated value of the digital intensity index is represented by the vertical lines in Figure 2, and the confidence intervals are given by the horizontal bars. We note that *Wholesale and retail trade* is the industry with the highest digital intensity index in this version of the index.

Tests of the difference in digital intensity between type firms in two industries are presented in Table 5 as an example. Blue cells indicate industries in row (*i*) that have a higher value for the indicator than the industry in column (*j*). From this we conclude that *Wholesale and retail trade* has a higher digital intensity than all industries except *Information and communication*, and *Information and communication* has a higher digital intensity than all industries except *Wholesale and retail trade* and *Manufacturing*. Purple cells indicate that (a type firm in) the industry in row (*i*) has a lower digital intensity than a type firm in the industry in row (*j*). *Construction* has a lower digital intensity than all industries except *Real estate activities.* Pairings of industries where the difference in digital intensity is not statistically significant ($p<0.05$) are not highlighted. From this we can infer that it is difficult to produce and interpret a "ranking" of industries with respect to digital intensity.

Figure 2. Composite index of digital intensity, excluding the use of social media (with 95 per cent confidence intervals).



[2] Greene (1991)
[3] The confidence intervals are calculated from a multivariate probit. The log-likelihood for the version with all questions (11 equations) was not continuous and could not be maximised.

Note: The point estimate is indicated by the vertical red line and the confidence interval by the blue horizontal bar. The indicator is calculated from a multivariate probit (7 equations). Social media was excluded due to estimation problems. The point estimate is the estimated joint probability of answering 'yes' to all questions in the indicator for a type firm in industry (b).

Sources: Statistics Sweden: ICT usage in Enterprises 2014, Structural Business Statistics 2013, and the registry of enterprise groups 2013. Growth Analysis: International entreprises 2013. Calculations by the author.

Table 5 Difference in digital intensity (excluding social media use) between industries.

	Utilities	**Construction**	**Wholesale and retail trade**	**Transportation and storage**	**Accommodation and food service**	**Information and communication**	**Real estate activities**	**Other services**
Manufacturing	0,07	0,14	−0,09	0,07	0,03	−0,04	0,10	0,05
Utilities		0,07	−0,16	0,00	−0,04	−0,11	0,03	−0,02
Construction			−0,23	−0,08	−0,11	−0,18	−0,04	−0,09
Wholesale and retail trade				0,16	0,12	0,05	0,19	0,14
Transportation and storage					−0,04	−0,11	0,03	−0,02
Accommodation and food service						−0,07	0,07	0,02
Information and communication							0,14	0,09
Real estate activities								−0,05

*Note: The table entry is the digital intensity in the type firm in the industry given by row (i) minus the digital intensity in the type firm in the industry given by column (j) $(\mathrm{DI}_i - \mathrm{DI}_j)$. For blue cells (ij), the industry on row (i) has a **higher** digital intensity than the industry in column (j), p<0.05. For purple cells (ij), the industry on row (i) has a **lower** digital intensity than the industry in column (j), p<0,05. The differences in digital intensity between industries in cells that are not highlighted are not statistically significant.*

Sources: Statistics Sweden: ICT usage in Enterprises 2014, Structural Business Statistics 2013 and the registry of enterprise groups 2013. Growth Analysis: International entreprises 2013. Calculations by the author.

Detailed results

Table 6. Estimated probability for type firm for each question in the index. Standard errors are in parentheses.

	iterp	crman	crmstr	sisc	awsell	aebuy
Manufacturing	0,718 (0,032)	0,278 (0,034)	0,499 (0,038)	0,147 (0,029)	0,136 (0,022)	0,58 (0,033)
Utilities	0,47 (0,055)	0,232 (0,044)	0,528 (0,054)	0,157 (0,044)	0,216 (0,044)	0,612 (0,051)
Construction	0,454 (0,049)	0,115 (0,03)	0,251 (0,045)	0,0972 (0,031)	0,114 (0,028)	0,516 (0,048)
Wholesale and retail trade	0,631 (0,037)	0,465 (0,039)	0,604 (0,037)	0,299 (0,042)	0,342 (0,036)	0,617 (0,035)
Transportation and storage	0,495 (0,056)	0,104 (0,033)	0,227 (0,047)	0,198 (0,051)	0,239 (0,046)	0,55 (0,053)
Accommodation and food service	0,474 (0,054)	0,287 (0,047)	0,403 (0,051)	0,219 (0,048)	0,411 (0,052)	0,656 (0,047)
Information and communication	0,544 (0,058)	0,44 (0,059)	0,61 (0,057)	0,182 (0,053)	0,4 (0,057)	0,601 (0,053)
Real estate activities	0,588 (0,053)	0,245 (0,047)	0,639 (0,051)	0,12 (0,037)	0,147 (0,037)	0,623 (0,05)
Other services	0,536 (0,049)	0,336 (0,046)	0,573 (0,047)	0,138 (0,039)	0,179 (0,033)	0,67 (0,04)
Number of observations	3604	3604	3605	3607	3615	3598

	axsell	snet	blog	cntshr	wiki
Manufacturing	0,247 (0,035)	0,058 (0,014)	0,32 (0,032)	0,147 (0,024)	0,0208 (0,007)
Utilities	0,041 (0,022)	0,111 (0,029)	0,421 (0,053)	0,136 (0,032)	0,0357 (0,014)
Construction	0,0759 (0,028)	0,0167 (0,012)	0,246 (0,038)	0,0453 (0,021)	0,0132 (0,008)
Wholesale and retail trade	0,169 (0,029)	0,0817 (0,018)	0,517 (0,037)	0,13 (0,023)	0,0275 (0,009)
Transportation and storage	0,25 (0,05)	0,0271 (0,017)	0,202 (0,042)	0,03 (0,019)	0,0045 (0,005)
Accommodation and food service	0,0558 (0,021)	0,229 (0,045)	0,782 (0,043)	0,16 (0,036)	0,000442 (0)
Information and communication	0,0943 (0,034)	0,486 (0,063)	0,791 (0,045)	0,524 (0,061)	0,0673 (0,022)
Real estate activities	0,0136 (0,009)	0,115 (0,032)	0,336 (0,048)	0,109 (0,03)	0,00857 (0,005)
Other services	0,0525 (0,021)	0,199 (0,036)	0,518 (0,047)	0,166 (0,033)	0,0422 (0,014)
Number of observations	3605	3597	3598	3596	3597

Sources: Statistics Sweden: ICT usage in Enterprises 2014, Structural Business Statistics 2013, and the registry of enterprise groups 2013. Growth Analysis: International entreprises 2013. Calculations by the author.

1 *References*

Acemoglu, & Autor. (2011). Skills, Tasks and Technologies: Implications for Employment and Earnings. In O. Ashenfelter & D. Card (Eds.), *Handbook of Labor Economics* (Vol. vol. 4B). Amsterdam: Elsevier.

Adermon, A., & Gustavsson, M. (2015). Job Polarization and Task-Biased Technological Change: Evidence from Sweden, 1975-2005. *Scandinavian Journal of Economics, 117*(3), 878-917. doi: 10.1111/sjoe.12109

Brynjolfsson, & McAfee. (2014). *The second machine age, Work, progess, and prosperity in a time of brilliant technologies*. New York, USA: Norton & Comany Inc.

Cardona, M., Kretschmer, T., & Strobel, T. (2013). ICT and productivity: conclusions from the empirical literature. *Information Economics and Policy, 25*(3), 109-125. doi: http://dx.doi.org/10.1016/j.infoecopol.2012.12.002

Government appointed commission. (2012). *Small firms - large IT possibilities*. (SOU 2012:63).

Growth Analysis. (2014). *Productivity and digitalisation in Sweden, How digitalisation drives productivity growth*.

Growth Analysis. (2017). *Digital maturity in Sweden*. The Swedish Agency for Growth Policy Analysis (Growth Analysis).

Kane, G. (2017). Digital Maturity, Not Digital Transformation

Kane, G. C., Palmer, D., Phillips, A. N., & Kiron, D. (2015). Is Your Business Ready for a Digital Future? *MIT Sloan Management Review, 56*(4), 37-44.

Ministry of Enterprise and Innovation. (2016). *Smart industry - a strategy for new industrialisation for Sweden*. (N2016.06).

Westerman, G., Tannou, M., Bonnet, D., Ferraris, P., & McAfee, A. (2012). The Digital Advantage: How Digital Leaders Outperform their Peers in Every Industry *Capgemini Consulting and the MIT Center for Digital Business global research*.

Eurostat Community Survey on ICT usage and E-commerce in enterprises 2014. General outline of the survey, Eurostat, uri: https://circabc.europa.eu/sd/a/cd0f3e86-d720-407e-88c9-b2f10a64410b/Questionnaire%20ENT2014.pdf