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The FIRE consortium is an international and interdisciplinary research collective unified by a core inquiry: how is society, particularly from a legal viewpoint, being fundamentally reshaped by the swift digitalisation of business-related information? This inquiry deeply resonates at both national and international echelons, given the extensive influence digitalisation holds over the social, economic, and legal dimensions of our global society.

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Chapter 7
The Current Corporate Income Tax Rule Architecture & Automated, Real-Time Taxation – Would the Necessary Prerequisites of Today’s Tax Rules Have to Be Changed?

Abstract: Income taxation handled by AI and carried out in real time (ARTT) is promising in many ways. It could, for example, save a lot of time and money for both companies and tax administrations, be based on facts rather than estimates and probably also help prevent economic crime. But what are the obstacles and how would taxes and taxation actually work in such a context? This chapter includes a discussion on whether current substantial corporate income tax rules are compatible with ARTT or if their design will have to be changed to make it possible to apply them based on automatically generated data. It is argued that many of today’s tax rules are not suitable for an ARTT context and that significant changes in current income tax principles are probably required for ARTT to work.
7.1 Introduction

As pointed out in the OECD Tax Administration 3.0 report, there are a number of promising possibilities with new technologies and procedures in taxation. Such a development would also have an enormous impact on a number of questions outside taxation, such as investments, integrity, crime prevention, transaction costs etc. This paper does not, however, concern those risks and possibilities, but the possibility of making such a system work. I will here, from a “legal technical tax perspective”, critically look at some of the challenges of automatically created and/or distributed “raw” financial data and automated, real-time income taxation (below referred to as ARTT, for Automated, Real-time Taxation). This paper mainly concerns the procedures of taxation, but the main point is to try to show that implementing the kind of new tax procedures discussed here (ARTT) is likely to require major changes, not only in (1) developing more sophisticated algorithms etc. and (2) changes to today’s tax procedures (in a broad sense) and as regards (3) the creation of new ways to produce and distribute financial data on which to base the taxation, but also (4) concerning today’s substantial tax rules and principles of taxation (and probably also those of financial reporting). Some of these questions (such as making legal AI work) have been discussed a great deal in the literature, but not the issue that is the focus of this paper, i.e. the provision of relevant data for the said use, and the need to change the tax rules so

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1 Many thanks to (in alphabetical order) Bo Harald (Senior Advisor at the Finnish Council of Regulatory Impact Analysis and previously Nordea), Magnus Kristoffersson (Örebro University), Peter Lindholm (Swedish Tax Agency), Gustav Lindkvist (Gustav Lindkvist Förvaltningsprocess) and Jan Sjösten (Swedish Tax Agency) as well as participants in seminars/conferences at the universities of Linköping and Örebro, for highly valuable feedback on previous versions of this paper. All remaining errors and shortcomings are my own.


3 The new procedures of taxation discussed here concern in particular the procedures that are transforming today’s income tax, especially regarding corporate income taxation, from a highly manual procedure, handled on a yearly basis (see Ch. 2), into something that is automated and where tax is calculated (perhaps also paid) in real time – close to transactions.

4 See, for example, Ashley (2017) and Gardner (1987).
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that they work well with the data that could or should realistically be made available.

Thus, what we are discussing here, is 1) a new kind of system where data is created and shared automatically and more or less instantly and continuously (i.e. RAW data, as they are unprocessed on delivery) with (at least) the tax authorities which, 2) based on this data and with the help of AI, automatically apply income tax rules and 3) that this application means that taxation is \textit{finally} determined in such a way that it does not require tax returns to be submitted on an annual basis or that yearly general decisions are made on taxation. We are thus, as a thought experiment, looking at a system for automated, real-time income taxation. An exciting idea, to say the least. It may entail fantastic possibilities. But \textit{would it work under current substantial tax rules?}

I will start by looking at how \textit{conventional} taxation works. To the extent that this legal and administrative technique is to be replaced by ARTT, we have to \textit{offer another way that would replace the functions of today's model} – and preferably in a satisfactory way. Thus, in the following section, I will first (Ch. 2) describe how conventional taxation works, thereafter (Ch. 3) I will problematize this from the perspective of using ARTT under today’s tax rules and scout for some what I imagine would be necessary changes in the tax system, for ARTT to work. Chapter 4 gives a concluding, brief general reflection on the possible way forward.

The questions discussed below are long, and it would seem, give rise to almost countless further questions and many different areas of expertise. This makes delimitations necessary.

1. This paper does not concern what would be legal (for example, in relation to current constitutional law), moral, rational or desirable, nor about the necessary technology as such. The analysis is only concerned with data, tax rules, and the automatic application of the latter in relation to the former.

2. The examples of current tax rules are taken from Swedish income taxation. That means that some of the rules that are applicable will be accounting rules; for that reason, accounting is of some importance here, although it is not discussed in its own right. VAT and excise taxes are not discussed below, and nor is international legislation or national legislation in other countries. However, there is reason to
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presume that the examples and line of reasoning below have a level of general validity, outside corporate income taxation and outside Sweden.

3. In terms of AI, the perspective here is limited to what kind of AI is to be expected to be possible within a fairly foreseeable future. I am therefore not discussing “general super IQ AI” or some such, but rather AI of today’s standard (oriented towards the purpose discussed here) and somewhat extrapolated beyond that. Nor am I discussing a possible future where sensors are superintelligent and can record and report feelings and intentions etc. Instead, I am speaking about rather simple sensors, like GPSes, thermometers, cameras etc. – and of course such data that can be derived from invoices etc. So, no “all seeing eye” etc.

4. Neither the coding of the tax law so that it works for AI purposes, nor making AI interpret the law (including case law, legal principles, preliminary works etc.) as such, will be discussed in this paper. Here, I will simply assume that it will be possible for AI to understand and interpret tax rules (which, as will be discussed below, is not the same as applying these tax rules in real life cases).

5. This paper mainly concerns real-time definitive taxation, not “just” real-time preliminary estimations and real-time payments of preliminary taxes.

5 These are really important questions, and there is a complex relationship between the coding and the drafting of laws. See, for example, Governatori, G. et al. (2022).

6 “Definitive” in the tax context seems to be a relative term, considering the possibilities of appeals and reviews. What is meant here by definitive is that the taxation is not provisional in the sense that the intention is to make a final decision later on – not that there would be no possibility to make an appeal or review.
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7.2  The Point of Departure: The Modus Operandi of Conventional Taxation
– A Taxonomy of Tax Rule Application

7.2.1  Introduction
The design of a typical tax (and other) rule is that it refers to something outside the norm; a state of affairs or an event or something like that (this is the factual side of the norm, but as long as only the rule is concerned, the facts of the case are only abstractly expressed). If this (whatever it is) is the case, the rule provides a legal consequence of some kind. When applying the rules, the facts of the actual case have to be investigated and, through interpretation, related to the rule(s) in order to decide whether or not it is applicable (or how it is to be applied). Basically, this is no different in a ARTT context, but, as will be discussed in chapter 3, there are certain significant differences with regard to the facts, the interpretation of the rule and (it will be argued) how the rules can or should be designed.

7.2.2  The Substantial Tax Rule
The law can relate to many kinds of facts and situations. For example, when deciding in tax cases, you might have to make sure that facts such as these actually hold true.7

• What is the civil law background for this transaction or situation and how should the answer to that question affect taxation?8 How does the civil law background affect the accounting and how does the accounting in turn affect the taxation in this case?9

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7 These examples are questions that sometimes will have to be answered when applying Swedish income tax law.
8 Civil law could be of importance within income taxation for different reasons, for example, if its classifications are to be seen as binding for a tax question or if civil law is of importance for evaluating the economic substance (for example, the likelihood of a loss in a civil law court case).
9 See Kellgren (2012).
• How are these kinds of transactions to be handled within accounting and are they correctly handled in this case, by this company?\(^{10}\)
• Does this kind of cost seem to be relevant as a means to increase the profit of the company?
• What where the insights or intentions of the Management of this company with regard to this project?
• Is this a non-profit organization?
• Was it XX’s intention to save tax through this rather odd series of transactions and, if so, how much would have been saved, had it been accepted by the tax authorities, and compared to what?
• Will we be able to sell this product once it is fully developed, and when and at what price?
• Did they bribe him/her, in the sense that is meant in the rule prohibiting deduction of such costs?
• Is this an R&D cost? What are the plans, goals and possibilities regarding R&D project X?
• Is the company likely to lose in court against X and, if so, how much will it likely have to pay, and when?
• Does the second transaction (T2) change how we look at the first one (T1)?
• What is the current value of that intangible asset?

Such necessary prerequisites and complexities may not be easy to handle when applying the law, nevertheless they are there, and they are handled manually.

7.2.3 Getting the Required Data into the Decision-Making Process

As shown above, the necessary prerequisites of many rules call for varied and sometimes “subtle” kinds of information (such as insight, intention, relevance or “degree of”). Beyond that, the law sometimes, explicitly or implicitly\(^ {11}\), allows the taxpayer to *make choices* with regard to how to use tax law. These choices may be with regard to the assessment and

\(^{10}\) Accounting law must often be understood and properly applied at least in Sweden, where accounting is often more or less incidental in relation to taxation.

\(^{11}\) See Kellgren (2012).
classification of facts, such as the size of a future cost or perceiving an asset as an expendable equipment, or choices between alternatives explicitly provided for in rules. The taxpayer might be free to choose between, for example, different rules, valuations and procedures. These choices are also a kind of data, currently sometimes needed for taxation. Especially within corporate income taxation, the taxpayer supplies many such facts, through a degree (not seldom a high degree) of manual labor and sometimes subtle and complex estimations.

7.2.4 Interpreting the Norm
Interpreting the norm is done manually with the help of the doctrine on the proper use of legal sources. Every lawyer knows the basics of this process, and we are well aware that it is not purely a mathematical or logical process, but that it is also a (to some degree) normative one, partly based on personal judgement.

7.2.5 Evaluating the Data: Facts and Evidence
The data and evidence available in each case are assessed in relation to the relevant tax rules. This is carried out manually, but the process can be aided by different kinds of algorithms, statistics etc. The bottom line, however, is that the judge (etc.) has to decide what to believe happened (or what has been proved to have happened) and what the situation was or is, based on the evidence.

7.2.6 Applying a Norm on the “Facts” of the Case
Traditionally, the application (or not) of a norm on the “facts” of the case is also carried out manually. It is important to emphasize that although there are plenty of straightforward cases and legal sources (doctrine, case law etc.), the application of a norm on the “facts” of the case is often a highly complex procedure from a philosophical perspective.\(^\text{12}\) It concerns what you think of the norm and the correct interpretation and application of the norm in relation to the specific case and the data available. To a certain extent, it is certainly a “manual” intellectual process – where facts, traditions and logics but also normative judgments on the part of

\(^{12}\) See, for example, Tontti (2004) and Rissland (1987).
the judge meet in a way that is not fully expressed in either the written grounds for a decision or fully explored in empirical research.

7.2.7 Final Remarks
The above-mentioned steps are handled by the parties and sometimes by a judge. Some data is already today delivered automatically, but a great deal is handled manually and processed through evaluation, choice etc. by the taxpayer (instead of being delivered automatically as raw data). Further, new facts and evidence can be requested and supplied. The further assessment of the said data and the interpretation and application of the tax rules are then mostly handled manually. This process leaves some room for discussion and debate both regarding the facts of the case and the interpretation and decision. With this background, let us now see how these steps might be handled within an ARTT context.

7.3 Fully Automated Real-Time Taxation – Problems and Necessary Adaptations

7.3.1 Setting the Scene – Minimal Changes, but ARTT Taxation
The fact that tax rules, as they are currently formulated, seem likely to cause problems when it comes to application within an ARTT context is discussed in a wider perspective below. However, in the ARTT context, taxation is carried out in real time, so a basic prerequisite for this scenario is that the rules are at least changed in exactly that way – from annual assessments to real-time assessments. So, let us say, as a thought experiment, that the tax rules are the same, except for the fact that they are (written so that they are) applied in real time, and let us have a look at how this would seem to meet the requirements in ARTT taxation. The focus lies on probable difficulties regarding the use of today’s tax rules (with the above-mentioned adjustments for real-time taxation) and on discussing the nature of changes in today’s substantial income tax rules and principles when switching to ARTT taxation.

It is important to note here that we are not only speaking about (1) the use of AI when applying tax law, but on this taking place (2) on
automatically generated and delivered data and (3) is carried out (more or less) in real time.\(^{13}\) When AI is applying the law in a more conventional, manual annual process, it is fully possible to submit and request manually submitted data, estimations, predictions and preferences etc. and also to have some kind of dialogue vis-à-vis the taxpayer. In that case, things can be largely old school, much like when, for example, a judge is applying the law in a tax case, with the exception of a situation where AI makes (or suggests) a decision. However, in a fully-fledged ARTT context, there is no room for asking the parties (for example, a company) for more information, such as data, estimations and preferences. Within our ARTT scenario, only information that is already available can be used. Needless to say, AI could identify additional information needs and request this information – but, at least in these cases, that it is no longer real-time taxation.

7.3.2 Getting the Required Data into the Decision-Making Process – or Coping Without, by Asking for Less or Other Facts?

We must contemplate the following: is it possible to create an automated data production that would make it possible for AI to make tax decisions in relation to today’s tax rules? As many of today’s rules take aim at quite subtle qualities in the facts of the case (see 2.2), it would seem very hard indeed to automatically create data that could make AI (even a highly bright one, and regardless of whether it is highly skillful at the abstract interpretation of laws) handle all those kinds of states of mind, plans, relations insights etc., referred to in the tax norm.

Perhaps, or even probably, it would be possible to handle some, or even many, of today’s rules, (1) exactly as they are. And perhaps it would be possible to (2) adjust some of the necessary conditions in today’s tax rules just slightly, so that the rule would have close to the same function as it does today, but be better adapted for ARTT technology. However,

\(^{13}\) As Kristoffersson E., 2021 points out, Sweden started applying automated decision-making in many fields of tax law already in the late 1970s and as Donahue (2018) points out “On a practical level, lawyers should be aware that software powered by AI already carries out legal tasks. Within a few years, AI will be taking over (or at least affecting) a significant amount of work now done by lawyers”.
I find it very hard to believe that necessary conditions like intent, plans, real value etc. would be possible to manage based only on automatic data, run through (even a super bright) AI (see also, just below, on “phantom images”).

All tax rules have a decisive point in time (or period) on which the tax assessment should focus (often it is the time of a transaction or the end of the year). It is debatable, for reasons of both predictability and legality, under what conditions the development (different kinds of new facts) after this point in time (ex post assessment) should be taken into account by the courts. Nevertheless, it should be said that such an assessment is not possible if definitive taxation takes place in real time – instead, taxation will have to be managed on a purely “now” basis.

Thus, it seems like (3) some rules would have to be changed more radically. This would be needed even for a very well-educated, highly intelligent human judge, if she had to apply the law based only on daily fresh raw data – such data simply do not support the kind of conclusions and assessments necessitated by many of today’s income tax rules. Thus, the necessary prerequisites of the tax rules must be made compatible with the possibilities and limitations of ARTT technology.

Thus, in this hypothetical case, the rules are to be changed to (automated) real-time taxation. This gives rise to a number of dilemmas. One example is that it will be hard to handle future major deductions and, in the case of progressive taxation, expected income for the rest of the tax year (to avoid uneven tax burdens over time). Another example regards matching. It is often argued that income and expenses should be matched. Perhaps this would be too tricky to carry out on a real-time basis that it should be changed into something like day-by-day, or week-by-week, taxation – at least if tax payments are also in real time. Otherwise, taxation would risk being very “stochastic”, in some cases – high income one day, high cost the next, on the same deal. A week-by-week taxation payment would make it easier to manage at least some level of matching of income and expenses (but would probably fail to take into account more future expenses connected to transactions/income in the present). A somewhat longer period than (more or less) literally real time would also reduce the work burden; in the case of valuation etc. it is not schematic but

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14 See Kellgren et al. (2019).
instead calls for some manual estimations. Manually managing complex estimations on a real-time basis (such as every minute) is, needless to say, simply out of the question. The above applies for basically every kind of manual well thought through estimation (classification, valuation etc.), today made once a year. For example, the same could be said for debt valuations.

In all probability, far more schematic solutions for this kind of manually made estimations by the business management today and that are currently carried out once a year, would turn out to be necessary. However, the solutions do not necessarily have to be fully schematic. Instead, new information (for example, regarding a court case, an asset or events on the stock market) could be allowed to affect the taxation.

It would also be possible to perform some posts, such as the depreciation of assets, in advance, manually and more seldom, but calculated day-by-day. Needless to say, that would not be an automated process, but it would make it possible for an AI to calculate the tax on a daily basis. Thus, certain information and estimations, choices etc. could be processed and delivered manually and in advance. However, this would no longer be fully-fledged ARRT.

In fact, the substantial tax rules must probably be changed in many ways, in order to blend well with the ARRT way of taxation. This is discussed more below. However, nobody knows exactly what kind of necessary conditions, in the future, that will be possible to handle within the said context. No doubt, computer power, skillful programming and big data (a lot of data from many and various data points) makes it possible to create “phantom images” of many things – such as perhaps insights, probabilities etc. Most probably, what is possible to manage automatically is also to an extent a moving target, as technology develops, but I am convinced that some of today’s rules have such a clear “human aspect” that they would not work (well or at all) within an ARRT context.\footnote{See more about problems connected to such rules, Ashley (2017) Ch. 2.}

Certainly, there are also many easy, or even obvious, decisions when tax law is applied. In those cases, ARRT taxation would often be possible. An example of this kind would be road tax (based on automatically taken photographs combined with AI-interpreted license plates) and, in many cases, the taxation of salaries (where it can be based on control data such
as cash flows).  

An interesting real life example is the French swimming pool tax, based on an artificial intelligence computer vision system.  

7.3.3 Interpreting the Substantial Tax Rule and Evaluating the Data As Facts and Evidence

There are already a lot of things AI can do, and actually already does, in terms of understanding data/facts and interpreting and applying the law – and in the future, it will (gradually) be able to perform even more impressive tasks. I think AI may very well handle many questions regarding the interpretation and application of the law. But there are also truly and deeply difficult cases, not least many of the cases currently handled in supreme tax courts. There are difficulties in interpreting the law and in evaluating the facts available as evidence of which both can be extremely onerous.  

In the foreseeable future, the courts will probably be better at handling those cases – just as they have handled them so far, but perhaps aided by AI and big data. At least as long as it comes to interpreting tax laws as they are written today, I think it would be a very big step indeed to leave every case to AI – and too much of a step, at least for the relatively foreseeable future. However, AI could probably apply tax rules in relation to simple data in many cases.  

Gradually adapting the tax laws to ARTT technology would extend the number of tax cases that could be handled more or less automatically. Many easier questions could probably be fully handled by ARTT technology, even in corporate taxation. Perhaps this would be the way forward – applying ARTT technology where it works well but going “human mode” (with no real-time decision making, but more often than yearly) where that works better. This would mean something of a “parti-

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16 See also note 13.
18 Not least, the use of AI for evaluating evidence can give rise to biased judgments due to statistics being used in a way that is inconsistent with sound principles of justice.
19 See for example note 15.
20 It could be noted that the goal for the Finnish tax administration was that the taxation of individual taxpayers would be as automated as possible (https://www.vero.fi/en/About-us/finnish-tax-administration/the-development-of-digitalization-in-tax-administration/towards-automated-taxation/ 2022-11-22).
tioned solution” of the modus operandi of taxation, where some rules are handled within an automated process and others are kept old school. As technology, legislation and know how regarding ARTT taxation develops, the proportion of the total number of tax issues that could be handled automatically and in real time will increase substantially.

7.4 The Way Forward?

To some extent, and from a legal technical standpoint, Automated Real-Time Taxation (ARTT) is pretty easy to establish. However, handling every tax issue the ARTT way would be quite another thing – and probably not realistic, at least not as long as we stick to today’s tax rules and principles. Many of today’s – not seldom thoroughly thought thorough – principles for corporate income taxation (and accounting, which is not very well covered in this paper) would then be jeopardized. But still, ARTT taxation is in many respects highly promising, so it certainly seems worth trying to take taxation in that direction.

What would, in that case, be the proper way forward? My answer is perhaps not very thrilling; it is “go hybrid” and “take it step-by-step”. Let me break this down into four aspects.

1. The data (facts, choices and estimates etc.): Create and send data automatically (once questions of integrity, trade secrets etc. are solved), but, until we (humanity, the technology and the rules) are ready for the next step, leave and process certain information manually. In that way we will complement ARTT technology and have all the necessary data that the current tax rules necessitate. The, thus delivered, big data will potentially be of great use for tax administrations, for example, for crime prevention, regardless it is used for full ARTT or only part ARTT.

2. AI: Use AI on said ARTT data and also on manually crafted data, as far as it works well, which is a step-by-step process – and increasingly can be handled through AI as it (and its surrounding systems, such as data) improves and the tax rules are adapted for this context. Until we are there, and to the extent we are not, let us keep up the manual application of law as far as it is needed (but probably not as seldom as on a yearly cycle). While it is undoubtedly wise to proceed cautiously when taking major significant steps, whose effects cannot be fully anticipated, it is also
very likely that once the step is taken, creativity will be re-energized – when it can create real-life benefits and the new situation, with its at that time current needs, conditions etc., are better known. The art of swimming is not perfected until you are working on it actually in the water…

3. **Real-time taxation**: Head in the direction of real-time taxation, but keep a keen eye on the difficulties. Maybe real-time taxation should be seen as something basically *preliminary*, that, after a certain time, is not preliminary anymore. That would give the tax administrations some leeway to see if things are correct or if the AI system made a mistake, if the data was corrupt (and how and why) or if subsequent transactions are somehow connected to previous transactions in such a way that the substance does not match the form etc. The taxpayer could use slightly simplified principles for the calculation of automatic and daily provisional tax payments, in order to review them and make some fine-tuning adjustments (e.g., if a non-deductible item has been accidentally deducted). In this way, many of the benefits of real-time taxation would also be achieved. However, the last step – to switch to real-time *definitive* taxation – could come later. It should be noted that many of the difficulties discussed above with real-time definitive taxation would also apply to provisional taxation – but these difficulties, and errors, would be easier to live with in a constitutional state, as they can subsequently be discovered and adjusted for. Another possible instrument to experiment with in this context would be a process whereby a provisional tax assessment would have to be approved periodically by the taxpayer and by the tax administration.

4. **The substantial income tax rules**: If we want to go into ARTT, the tax rules must be made suitable for this – unless they already are, which is probably often the case. The rules must “ask for” data that can be automatically generated and that are suited for AI application. This should probably be managed step-by-step, for example, chapter-by-chapter in the Income Tax Act. Adapting tax rules to ARTT may lead to a loss of some of the qualities of today’s tax law and tax procedure. At least, there is a risk of that. Kristoffersson believes that future tax rules for ARTT might have to have a more “*simple*” and “*binary*” character\(^1\), and, in many cases,

\(^1\) Kristoffersson M., (2022). I see “binary rules” as rules taking aim at numbers rather than other facts.
that is probably true. Perhaps a realistic scenario would even be a move towards some kind of *transaction tax*. Anyway, with a hybrid, step-by-step method, the process can be controlled, tested, evaluated – and gradually improved. Tax rules that are hard to combine with ARTT would need to be thoroughly inventoried. In the end, I suspect *many of today’s qualities in income taxation would be lost*, if we went “full ARTT” in corporate income taxation. However, perhaps *even more would be gained* in terms of lowered transaction costs and new ways (perhaps different kinds of transfer payments) to realize that the objectives that current income tax rules have helped to achieve have been conceived and implemented. Perhaps, sooner or later, a switch to ARTT taxation would fundamentally change the way we look at how we ought to tax ourselves. In the end, this all boils down to a parliamentary issue – what kind of tax laws, tax technology and tax procedures do we want? Regardless of this, only the possible is possible.

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