



TECHNICAL ASSISTANCE REPORT

Republic of Slovenia

Data-Driven Risk Assessment (Follow-Up)

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Prepared By

Ludvig Wier

Authoring Departments:

Fiscal Affairs Department

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GLOSSARY

CD	Capacity Development
CRM	Compliance Risk Management
CRMU	Compliance Risk Management Unit
CIP	Compliance Improvement Plan
CIT	Corporate Income Tax
DG	Director General
MNE	Multinational Enterprise
OECD	Organisation for Economic Co-operation and Development
PIT	Personal Income Tax
SFA	Republic of Slovenia Financial Administration
SFO	Special Financial Office
TP	Transfer Pricing
VAT	Value-Added Tax

I. INTRODUCTION

1. As a follow-up to the November 2022 field-based assignment to help improve risk assessment capabilities, this mission provided additional virtual guidance to the Republic of Slovenia Revenue Administration (SFA). This short assignment focused on resolving questions on implementation issues faced by SFA as they develop new modernized approaches to risk assessment for corporate income tax (CIT). This implied following up on the previous guidance given on:

- ✓ Ideal organizational arrangements to support data analytics
- ✓ How to access and utilize better and more data, including third party data
- ✓ Data workflows and processes with a view to streamlining and improving them
- ✓ How to improve data integrity
- ✓ Using data science and big data analytics to strengthen risk assessment
- ✓ Leveraging the value of country-by-country reports

2. The STX was extremely impressed by how quickly the SFA had adopted the tools and methods presented in the November mission. In particular, the engagement/stamina of the dedicated staff participating in the workshops was most impressive. This was demonstrated by the staff being well on their way to adopting the main advice from the November mission: a) to put greater emphasis on taxpayer size when determining risk b) to introduce empirically founded business risk rules when determining who to audit and, c) to build advanced predictive models

3. The STX emphasized that the SFA should introduce new empirical tools gradually – beginning with the lowest hanging fruits. The mission team was impressed that the SFA was far into the development of an advanced machine-learning predictive model to select CIT audit cases. But, at the same time the STX stressed the importance of reaping the lowest hanging fruits first before moving to the most advanced analytical tools e.g., by creating business risk rules using simple analytics and weighting these according to firm size.

II. SUMMARY OF ADVICE GIVEN ON NOVEMBER 2022 MISSION

4. The November 2022 mission concluded that the SFA had already laid the foundation to reap large benefits of advanced data analytics. The SFA had already established a highly competent "Analysis unit" (similar to a "Data Analytics Unit" in other fiscal authorities) and had data readily available due to timely investments in a data cleaning, manipulation and storage.

5. With an abundance of data readily available, the priority is to utilize existing data sources more systematically. In a matter of days, the STX was able to get high-quality data on

audits, tax returns, Country-by-Country-Reports, business risk rules and balance sheets of firms operating in the Republic of Slovenia. All easily merged using unique taxpayer identifiers. This is the bedrock of data analytics and SFA is on solid ground here. The main job ahead is therefore to utilize the existing data in a systematic manner. That is, to automatically identify risks based on systematic data-driven models utilizing all the available. Especially for the CIT risk assessments, there was scope for further reliance on this type of systematic analysis.

6. The steps needed to expand the usage of systematic risk analysis were in many cases (very) small. E.g., the STX found that the business risk indicators set up for transfer price case selection were accurate in predicting the yield of CIT comprehensive audits. Having a more systematic approach to CIT audit selection was therefore simply a question of utilizing existing work. Similarly, the transfer price business risk indicators could also be used to deliver on the previous IMF recommendations of setting up risk profiles for the largest taxpayers (in previous capacity development (CD) reports from 2022).

7. Systematic evaluation of past interventions/strategies. The STX found that previous audit strategies/business risk rules were not being systematically evaluated. Consequently, it was recommended that SFA use simple methods to evaluate business risk rules using past audit results. This could be done in simple scatterplots.

8. Using simple benchmarks and standard deviations could help improve existing business risk rules. The STX demonstrated how simple benchmarks such as industry profitability and standard deviations could help root business risk in systematic analysis (instead of intuition).

9. SFA should introduce thresholds in their measure of strike rates such that marginal corrections do not contaminate these statistics. A correction of €20 will rarely be perceived as a successful result of an audit given the number of resources spent. If resources are to be spent to maximize success, the measures of success such as strike rates should reflect meaningful adjustments. In particular, this is important when evaluating the accurateness of audit selection models.

10. The 30 largest taxpayers are always a priority and should be continuously observed. As the size distribution of firms is so heavily skewed, the largest taxpayers are always a priority and should be continuously observed (since the consequence of non-compliance is so large). As recommended in the previous CD reports, the SFA should create risk profiles for the 30 largest taxpayers (can be automated to a large extent using the TP indicators).¹ Furthermore, the SFA should establish one-to-one client account managers. These taxpayers should always be educated, able and willing to comply. If the risk profiles suggest otherwise, the SFA should immediately prioritize intervention (in the form of education, guidance or audit depending on the perceived risk).

11. Due to the easily accessible data, the STX and the SFA dedicated staff were able to construct four pilot empirical models to inform risk assessment. The ease of getting data and the collaboration between data analysts and business experts in delivering on this is an encouraging

¹ See Appendix III in John Middleton's 2022 CD report

sign for future projects. All data/code/workflows were handed over to the SFA (incl. additional models on customs not covered by the mission). The models constructed included:

- ✓ An advanced (random forest) CIT audit selection model (incl. deployment workflow)
- ✓ An advanced (random forest) VAT audit selection model
- ✓ Workflow to evaluate existing business risk rules against historical data (VAT/CIT)
- ✓ Country-by-Country-Reporting anomaly detection tool

12. All models had the same target of delivering real-time risk assessment using all available data. E.g., the mission team demonstrated how the CIT audit selection model could increase strike rates by 20-40 pct.-pts.

13. The mission team recommend the following priorities for the coming year. First, create risk profiles for the 30 largest taxpayers. Second, create business risk indicators for CIT. Third, put larger weight on firm size and redefine strike rates to reflect firm size. Fourth, evaluate existing business risk rules using historical data. Only when these simple adjustments are made, continue with the more advanced modelling. All steps in the list of priorities were demonstrated in the workshops and the workflows/models were handed over.

III. SUMMARY OF TECHNICAL ASSISTANCE ADVICE

A. Background

14. Eager to proceed with implementing previous recommendations, SFA requested follow-up work only one month after the initial assignment on data and analytics. This demonstrated the seriousness from which the SFA staff approached the recommendations given.

15. The workshops put an emphasis on the empirical recommendations given in the November 2022 report. In particular, the workshops focused on the newly developed risk assessment models that SFA had constructed for CIT audit selection.

B. SFA's plan to implement previous recommendations

16. The SFA began the workshops by laying out their short-term strategy to implement a more empirical approach to risk assessment in CIT. SFA's plan to implement IMF advice can be summarized as:

- ✓ **In 2023, the SFA work program will place particular emphasis on large taxpayers in the area of CIT.** SFA will implement existing and new strategies for the selection of taxpayers for CIT supervision on the basis of available data from internal and external sources.

- ✓ **Within this process, SFA will use known tools²where they will include CIT risk indicators recently identified.** On a smaller scale, SFA will use the results of the risk assessment model using general, domestic, and international tax risk indicators with the aim to test the model in practice for the purposes of improving the efficiency of the model in the future.
- ✓ **The annual supervision plan of the Special Financial Office (SFO) will also be adapted accordingly.** Comprehensive audits of all taxes are planned will be carried out by a team, including auditors that specialize in transfer pricing supervisions.
- ✓ **SFA will use an automatic risk analysis in the field of transfer pricing.** This approach will be used in combination with the new model, based on predictive analytics, and the current processes for case selection.
- ✓ **In addition to audits, SFA will use other activities to promote voluntary compliance.** For large taxpayers they plan to use questionnaires, preventive visits, and cooperative compliance approaches.

17. The STX applauded the speed with which SFA had proceeded with implementing previous recommendations. The approach of moving incrementally from simple to more advanced empirical analysis is logical and appropriate.

C. SUMMARY OF WORKSHOP DISCUSSIONS

18. Through virtual workshops the SFA demonstrated how they had further developed the advanced CIT audit selection model. The model builds upon the Random Forest model constructed in the November 2022 mission. The fact that the SFA was already fluent in using the freeware introduced in the November 2022 mission (KNIME^{® 3}) proved the tenacity of the SFA staff.

19. The advanced model constructed by the SFA far outperformed current audit selection models for CIT. Concretely, the model increased the predicted strike rate (measured as corrections larger than \$5 thousand) from 30 to 70 percent.

20. The mission team identified some areas for further improvement of the model:

- a. The CIT audit selection model was build using both data on comprehensive audits and partial audits. This is problematic and the SFA should instead develop separate models for comprehensive and partial audits. Moreover, separate models should be built for each type of partial audits (one for interest deduction audits, one for desk audits etc.). The main point being that the model can only function if the outcome/intervention is comparable in the data from which the model will try to draw patterns.
- b. Some taxpayers will self-correct their tax returns after an audit. The model is currently being fed the corrected tax returns (not the initial), which makes it difficult to predict non-

² For example, SFA has suggested using SAP Fraud Management

³ The IMF does not endorse any particular software.

compliance and does not mimic reality (audit selection will always be based on initial tax returns)

21. The STX emphasized the need to proceed with simpler types of risk analysis before moving to the most advanced. The SFA had made progress on building CIT risk rules using simple empirical analysis (deviations from averages etc.). The mission team suggested that these rules should be tested against past audit results using the KNIME® workflow.

22. The SFA presented their strategy for a gradual implementation of the advanced case selection model. The STX supported this approach and suggested following the advice from the November 2022 mission on how to use RCTs and “double-blinded horse races”.

23. The STX also suggested building advanced risk assessments models for Customs and VAT. In the November 2022 mission a risk assessment models for VAT and Customs were developed, these models more accurately predict risk due to the abundance of cases and are therefore an easier place to start on the journey of building advanced predictive models.

24. The STX engaged in a technical correspondence via email on how to best use AI/Random Forest and KNIME®. A summary of the correspondence is given in Appendix I.

IV. PROPOSED NEXT STEPS (SAME AS IN NOVEMBER 2022 MISSION)

Table 1: Summary of Suggested Actions to be Taken

Actions to take	Deadline	Responsibility	Implementation advice
Topic: Prioritization/endorsement by senior management			
1. Prioritize/endorse high-value work in the sphere of data analytics identified in this report by creating protected time for development of these projects. Deprioritize current low-value data tasks to free up time.	Short term (within next 12 months)	Director General (DG)/ Heads of department	The first step is for senior management to endorse/prioritize the data projects identified in this report. This should happen by dedicating protected time for development/education to the data analytics team and deprioritizing current low-value assignments such as preparing reports etc.
2. Move towards “top-down” risk assessments in CIT by defining and using existing business risk indicators	Short term (within next 12 months)	Heads of department/Working Groups (WG)	Begin by building upon the current TP business risk rules.

3. Increase emphasis on size of taxpayers in risk assessments	Short term (within next 12 months)	Heads of department/WG	By 1) risk profiling the 30 largest taxpayers and creating client owners 2) Increasing the threshold for "strikes" 3) weighing risk rules according to consequence
4. Endorse a multifaceted approach to compliance risk management	Short term (within next 12 months)	Heads of department/Working Groups (WG)	Ensuring that compliance is improved not just through audits but service/education as well
5. Move towards automatic exchange of third-party information from banks, other regulators and other relevant stakeholders	Medium term (within two to three years)	Heads of department/ Relevant stakeholders	Will in many (most) cases require legislative action.
Topic: Improvements in data analytics and the way-of-work			
1. Readjust risk rules to reflect expected adjustment/risk	Short term (within next 12 months)	Analysis unit and relevant business owners	To begin with simply by multiplying current risk rules with measures of size (turnover, tax paid, employees)
2. Build automated reports for the largest taxpayers	Short term (within next 12 months)	Analysis unit and large taxpayer unit	Begin by building upon the current TPbusiness risk rules. Update according to John Middleton's 2022 report Appendix III. Reports should also indicate suggestive actions such as "contact taxpayer" or "audit"
3. Build CIT business risk indicators	Short term (within next 12 months)	Analysis unit and relevant business owners	Begin by building upon the current TPbusiness risk rules.
4. Evaluate existing risk rules based on historical data and advanced models -> update accordingly	Short term (within next 12 months)	Analysis unit and relevant business owners	See KNIME workflow for inspiration.
5. Expand use of anomaly detection in TP using CbCR-data + other data sources	Short term (within next 12 months)	Analysis unit and TP unit	In particular, this analysis can inform which of the >2,300 cases of firms outside of safe-harbor thin capitalization rules to pursue. Prioritization should, again, also always rely on size of the taxpayer. The Compliance Improvement Plan (CIP) for international tax in John Middleton's 2022 CD report is a good

			place to start. See KNIME workflow for inspiration on how to do anomaly detection.
6. Advanced data analytics projects	Short term (within next 12 months)	Analysis unit, IT and relevant business owners	After the low-cost investments (1-5) the SFA can proceed with more advanced predictive modelling (such as random forest models etc.). See pilot models from this mission as inspiration.
7. Evaluate implementation of data analytics projects and devise remedying actions if necessary	Short term (within next 12 months)	Impacted divisions and Analysis unit	Aim is here to learn from past mistakes. A common finding is resistance to change, which should be dealt up front.
Topic: Organizational structure			
1. Ensure the Analysis unit supports the entire SFA	Short term (within next 12 months)	DG in consultation with senior management	Potentially by having them refer directly to the DG or as part of a CRMU.
2. Reestablish the Compliance Risk Management Unit		DG in consultation with senior management	As advised in previous IMF reports.
Topic: Staffing and training			
1. Prioritize end-user education in all existing applications	Short term (within next 12 months)		No application should be built without prioritizing end-user education and feedback
2. Establish learning programs from which data scientist will teach non-experts in data analytics	Short term (within next 12 months)	Analysis unit in conjunction with heads of divisions	The intention here is two-fold 1) alleviate the workload of the Analysis unit 2) ensure data science capabilities spread throughout the organization. The software KNIME® can be a good tool to conduct these trainings with its low barrier of entry.
3. Consider improving terms for data analysts with aim of ensuring recruitment retention	Short term (within next 12 months)	DG/HR	This could include having longer contract terms and/or designing "Golden handcuffs" through time conditioned compensation packages.
4. Retrain 1-3 non-data scientists from SFA to join the Analysis unit	Short term (within next 12 months)	Data Science Team and HR	The intention is two-fold: 1) bring business knowledge into the Data Science Team 2) expand the capacity of the Data Science Team. One possibility is to exploit the KNIME® software and available courses to ease this process.

<p>5. Start "tours" program where non-data analysts from SFA are embedded in the Analysis unit and vice versa.</p>	<p>Medium term (within two to three years)</p>	<p>DG and relevant heads of division in consultation with Analysis units</p>	<p>Make sure this aligns with the projects in the pipeline – e.g. if a customs selection project is taking off, then it make sense to collaborate with customs.</p>
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