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Characteristics of Consumption Changes in Alignment with Renovation Investments of Immovable Cultural Heritage

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In our paper we present the impact of final consumption change on a product by applying the meaning of the autonomous consumption multiplier. Similar to Leontief and Kahn we introduced the multiplier of autonomous consumption, and with it the concept of the influence of change in final consumption on production in the order of a series of subsequent periods. In our analysis, the Slovenian economic investments in the renovation of Slovenian cultural heritage buildings affect the revenue of the Slovenian economy by a multiplier of 2,945. The impact on value added is 1,236. With one million investments in the renovation of Slovene cultural heritage buildings, the revenue of the Slovene economy will increase by more than 2.9 million euros and value added by 1.2 million euros after the adjustment period. The analysed investments will enable employments of 32 employees and the utilization of 3 million euros in fixed assets.

Keywords: *Investment; GDP; Reproductive Chains; Input-Output Analysis; EU; Cultural Heritage; Do-No-Significant-Harm.*

Introduction

Cultural heritage is generally valuable to the community and individuals because of its cultural, educational, developmental, religious, symbolic and identification potential, or for the study of disciplines such as anthropology, archeology, architecture, ethnology, art history and history. According to the Slovenian Cultural Heritage Protection Act (ZVKD-1, 2008), cultural heritage represents all things inherited from the past, which state citizens define as a reflection and expression of their values, identities, ethnicity, religious and other beliefs, knowledge and traditions. Cultural heritage includes aspects of the environment that arise from the interaction between people and space over time, and is divided into tangible and intangible cultural heritage. Tangible cultural heritage consists of movable and immovable cultural heritage.

Given that immovable cultural heritage represents complex formations of cultural, architectural and identity value, it is important to ensure sustainable preservation, use and management over time. It requires special attention, which means increasing demand in the context of providing solutions for restoration of immovable cultural heritage, energy renovation and the consequent reduction in the use of energy sources while maintaining heritage significance. Renovation of immovable cultural heritage buildings represents a demand for construction services. Their result in this case is economic externalities offered by maintained cultural heritage sites (not only to the satisfaction of the local population, but also as an attraction for tourists from all over the world). On the other hand, construction services have also negative externalities in greenhouse gas emissions and in the generation of specific construction waste. Disposal of the latter can be organized in such a way that the state of the environment does not deteriorate due to them, and the greenhouse gas emissions are a lesser problem in case of renovation of buildings than in their construction. In 2019, the construction industry accounted for the largest share of total global final energy consumption of 35 % and energy related CO_2 emissions of 38 %. In the UN Environment Program (UNEP) Annual Report 2020 energy consumption in construction industry remains stable, despite the slowdown in construction industry growth in 2019, which slowed globally at the level of 2.6 %. In this context, construction activity in the EU reached the lowest growth rates since 2008. This can be attributed mainly to the investment consequences of the COVID-19 pandemic in 2020, and it is significant that CO_2 emissions are reaching their highest levels so far.

In the EU, an average of 18 employments were created per million-euro investment in energy renovation of buildings during the 2008 financial crisis. Similar to that, twelve years later the European Commission embarked on action plans for the EU's recovery from the COVID-19 pandemic. In the direction of confirming the EU's goal of a sustainable future, in 2020 European Commission proposed European Climate Law, which aims to legitimize the goal of making the EU climate neutrality by 2050. Based on these rules, the Buildings Performance Institute Europe has developed recommendations for economic recovery after the COVID-19 crisis towards energy renovation of buildings and thus achieving climate neutrality by 2050 (Vitali Roscini *et al.,* 2020). In accordance with these recommendations, the European Commission has adopted an investment plan "Renovation Wave: Collectively achieving sustainable buildings in Europe", which refers to the renovation of public and private buildings. As part of corrective measures to achieve the goals of sustainable development in the field of renovation of immovable cultural heritage buildings, Slovenia is obligated to rely on the EU

strategy towards the proper inclusion of cultural heritage in the EU's immediate response to the COVID-19 crisis, including the European Union's "Next Generation EU" instrument for revitalization. With this 750 billion euro instrument, the EU intends to increase the total financial capacity of the EU budget to 1.824 billion euro. An agreement on targeted expenditure increases in the long-term budget (the EU's financial perspective for 2021–2027) and on a package for the reconstruction of Europe adopted in 2020.

In our paper we analysed the impact of investments in cultural heritage buildings (facilities) on the return of economic growth. After the introduction, we described heritage energy efficiency investments in connection with the EU regulation 2020/852 and principle "Do no significant harm". Theoretical framework as well as the data and methodology used follows after that. Empirical results and conclusions of our paper are presented as last chapters.

Heritage Energy Efficiency Investments, EU Regulative 2020/852 and Principle "Do No Significant Harm"

The White Paper and recommendations to the EU Urban Agenda partnership on culture and cultural heritage represent a concept created in 2019 through the contributions of EU-funded projects (ICLEI & Eurocities, 2019). It is a synthesis in the field of cultural heritage and directs addressing to both tangible heritage and intangible cultural and natural heritage. The environmental objectives under the Regulative (EU Commission, 2020b) are defined for the fields of climate change mitigation; adaptation to climate change; sustainable use and protection of water and marine resources; the transition to a circular economy; pollution prevention and control and protection and conservation of biodiversity and ecosystems. EU Commission defined the mentioned regulative as, no measure included in the EU recovery plans should lead to significant harm to environmental objectives (EU Commission, 2020a).

It is relevant to realize (at list in the period of last fifteen years) that it´s necessary to follow the energy objectives that ensure the energy efficiency of the renovation of immovable cultural heritage buildings. There is an ongoing process of tendency for interest synergy between stakeholder groups in this field. That is between conservation and renovation segment, which refers exclusively on achieving energy efficiency of cultural heritage buildings. Immovable cultural heritage buildings represent 30 % of the European Building Fund. In the process of restoration of immovable cultural heritage, there is a significant tendency in stakeholders, such as owners and contractors, to connect and support in decision making processes (Haas, 2018). Niemczewska (2020) analysed a certain gap regarding the sociocultural impact of immovable cultural heritage resources for two groups of stakeholders: groups that have direct access to the heritage resource and groups that have no access to them or this access is limited. Results of her study shows that in the case of heritage re-adopted to commercial functions, there are differences in sociocultural impact. The very presence of heritage and only awareness of its existence in a given area is not enough for creating a sociocultural function by it in some aspects. Such heritage does not use its potential fully (Niemczewska, 2020). Findings of the research from Atakul, N. et.al. direct us to conclusions that despite there is enormous impetus and ensuing incentive for incorporating the formal theories and customized tools, the restoration industry has not yet exposed to formal Project Management and Project Risk management theories and practices to a greater level (Atakul *et al.,* 2014). Siehr (2014) investigated the risk connected to immovable cultural heritage and found out that the responsibility of the national state to care for cultural heritage and cultural objects is essential. International conventions may furnish help and advice and provide for monitoring any risk to the cultural heritage of state parties (Siehr, 2014). S. Khakzad formed a set of risk maps for coastal immovable cultural heritage in Brunswick County, claiming that it can assist managers and policy makers to prioritize their actions regarding conservation, preservation and management of coastal cultural heritage (Khakzad, 2017). In her case study, concerning a historic object in the form of a rural Polish house adapted for commercial purposes, Niemczewska (2021) investigates a tool for holistic impact assessment of commercially reused immovable cultural heritage along with the possibility to ensure the cultural sustainability of these assets themselves. The author proposes a holistic approach to impact assessment of given heritage resources on the economic, social, cultural and environmental pillars of sustainable development and to use the assumptions of EMAS or ISO 14001 systems for assessment of environmental aspects in case of reused cultural heritage assets.

The diversity of buildings of immovable cultural heritage does not allow the definition of a uniform pattern of renovation that could be applied to the entire buildings fund. Over the last fifteen years, authors analysing the restoration of immovable cultural heritage have tended to strike a balance between increasing the energy efficiency of immovable cultural heritage buildings and the quality of renovation in the direction of preserving cultural values. In the analytical field, there is an increased interest of authors in conducting research which deals with such issues in the context of the ways to improve the energy efficiency of buildings of immovable cultural heritage. An overview of development trends in the analysed area of the link between environmental objectives and investments in the restoration of immovable cultural heritage shows that advancing steps can be expected in the coming years in the context of achieving synergistic solutions. Based on the systematic literature review Streimikiene et al. (2020) developed an integrated framework for addressing energy poverty, just carbon free energy transition and climate change mitigation issues in the EU. They argue that more targeted climate change policies and measures are necessary in the light of the shortcomings of current measures to reduce energy poverty and realize climate change mitigation potential linked to energy consumption in households (Streimikiene *et al.,* 2020). Kanteraki et al. (2020) are examining their case study in terms of the energy consumption incurred for the buildings being built on the same seaside area and period of construction and at adjacent plots of the same distance from sea for ease of comparison; they also revealed, that during thermal energy oscillating conditions, corresponding relative humidity stresses were observed, indicating that the

vapor pressure handling should be taken into account towards comfort. They also discussed preliminary incremental cost evaluation and comparisons of energy upgrading under the criterion of simple payback period.

I.C. Nicu made a review of the published literature which indicates that the emergence of studies focused on the degradation of immovable cultural heritage by natural hazards started approximately 40 years ago, with an increasing trend starting from early in the 21st century. Author also claims studies demonstrate that conservation measures need to be implemented to protect and prevent further degradation of the world's cultural heritage, to preserve a legacy for future generations (Nicu, 2017). According to M. Economidou, more than a quarter of all European buildings were built before 1950, suggesting that many represent cultural, architectural, social and heritage values (Economidou *et al.,* 2011). Buda and Pracchi (2019), claim that achieving the preservation of materialized heritage, and in this context immovable cultural heritage, is crucial in achieving integrated sustainable development. In accordance with G. Franco and A. Magrini projects focusing mainly on environmental sustainability focus almost exclusively on measures that enable energy efficiency and cost savings, which is not necessarily compatible with preserving cultural heritage values (Franco & Magrini, 2017). In his paper analysing conservation of cultural heritage, V. Fassina describes the efforts of the European Centre for Standardization towards the development and application of CEN TC 346 standards. Standards relate to the harmonization of processes in the field, practices, methodologies and documentation for the preservation of tangible cultural heritage in order to support its preservation, protection and maintenance and increase its importance (Fassina, 2015). In his work, P. A. Collot, is discussing the French case how the Act on Housing Development, Urban Planning and Digital Technology has further contributed to weakening the heritage protection mechanisms and bestowed a priority on the construction of new buildings over the conservation and enhancement of old neighbourhoods and buildings (Collot, 2020). Mitic *et al.,* (2020) concluded that attempts to reduce CO_2 emissions and ensure a satisfactory rate of economic growth in Balkan countries can be partially achieved through the emissions trading systems. In their paper Streimikiene et al. (2021) are providing policy recommendations in the way of how to deal with low carbon energy transition developing indicators framework for it. They apply their framework for analysis how climate change mitigation policies in households targeting enhancement of energy renovation of residential buildings. Their framework allows to assess three main dimensions of sustainable energy development: environmental, social and economic (Streimikiene *et al.,* 2021). Borges, Saucedo-Acosta and Diaz (2020) claim that the type of economies of varieties of capitalism should be taken into account in the analysis of the determinants of economic growth.

Theoretical Framework

In the period before the great economic depression that followed the stock market crash on Black Tuesday, October 29, 1929, the majority of economists believed that prosperity is increased in line with the output growth and that any increase in supply at a sufficient low price is followed by increasing demand. This law, which otherwise applies only in rare and more or less exceptional cases, is known as the Say's law (Say, 1803). When it was unequivocally proven that this law was generally not true, it was shown through the crisis resolutions measures (for example, the New Deal in the US), that consumption growth stimulates and enables production growth. The connection was theoretically elaborated in 1936 by John Maynard Keynes in a book entitled The General Theory of Employment, Interest, and Money. Keynes used the term “general theory” to name a new theory that is fundamentally different from classical economic theory.

The increase of consumption affects economic growth directly and indirectly through the economic activity purchases from the supply side for the producer reproductive purposes and through the further use of producer income that have provided additional supply to meet increased demand and so on. In that matter we are discussing the multiplier effect of the consumption growth on economic growth. This impact reduces the marginal propensity to save, income taxation and import dependence on consumption. In the case that there are spare capacities in a given national economy, an increase in consumption affects the economic growth. According to Sobieraj and Metelski (2021), inflation is measured by the consumer price index (CPI) and is defined as the change in the prices of a basket of goods and services that are typically purchased by specific groups of households. When the economy is close to full employment and its capacities are fulfilled, an increase in consumption affects inflation and / or an increase in imports. The ratio between actual and potential gross domestic product (GDP) in a given national economy shows an "inflationary dam". With the growth of real GDP, this "dam" decreases, and with the growth of potential GDP (dependent on population growth, investment and the introduction of technological progress) it increases.

In parallel with John Maynard Keynes, his student Richard Ferdinand Kahn described the process of influencing the change in final consumption on a product with an autonomous consumption multiplier (Kahn, 1931; Pasinetti, 1991). According to Kahn, the change in autonomous demand (D) affects the growth (or decline) of the product by a factor of 1/ß (inverse value of the propensity to save β). In Kahn's autonomous consumption multiplier, we are most interested in the concept of the impact of a change in final consumption on production in the sequence of the following periods. A similar concept was used by Wassily Leontief (Leontief, 1951) in his input-output analysis. In Leontief’s analysis, the influence takes place through a chain of reproductive demand: the producer that covers initial demand needs semi-finished products (raw materials and/or related services) as intermediate consumption, and its suppliers have re-demand of this kind and so on. The decline in demand associated with the COVID-19 pandemic will have consequences of this kind.

EU and the rest of the world entered 2021 at the end of the deep economic crisis, which arose as a side effect of health measures to curb the spread of the COVID-19 pandemic. In 2020, real GDP in the Eurogroup decreased by 6.4 %, in the EU27 by 5.9 % and in Slovenia by 4.2 % (Eurostat, 2021). The reason was a drastic reduction in demand that exceeded supply-side constraints. In the Eurogroup, prices (inflation) increased only by 0.3 % in 2020 (they fell by the same percentage in Slovenia), while in the EU27 they increased by 0.7 % (Eurostat, 2021). In these circumstances, market relations would (in themselves) lead to a spiral economic crisis with the interplay of declining production on declining incomes and thus declining incomes on a further decline in production. Increased uncertainty and declining demand due to the increased share of savings in the income of the economy and the population would add to this. In such a case, economic policy must react, and in a given global nature of the crisis, it is best to react in coordination with trading partners. The reaction of economic policy means increased government demand combined with expansionary monetary policy (low interest rates at the initial impulse of increased government spending affect the growth of economic investment and purchases of durable consumer goods in households). Part of the increase in government spending in the economic conditions of the first half of 2021 is also the financing of investments in the renovation of cultural heritage buildings. T. Ivanc and R. Vrencur address in their work the issue concerning the effectiveness of the immovable cultural heritage protection from the aspect of national funding systems, as well as from the aspect of interstate funding sources and financing programmes. They found out that the funds invested in renovation of immovable heritage do not reach assessed values attributed to individual property (Ivanc & Vrencur, 2014). Vojinovic et al. (2020) went further with providing a measure of the optimal state incentive needed for the purpose of regular investment in maintaining immovable cultural heritage. They claim that according to the results of the input-output analysis, regular maintenance annually results in 60.9 million euros' value added (Leontief's production function - effect via reproduction chain) with 22.4 million euros higher general government revenue; the net fiscal effect of incentives for these investments is positive for 36.5 % of public funds spent (Vojinovic *et al.,* 2020).

Given the role of the modern state in economic development, the EU is trying to link the project of stimulating economic growth or eliminating the consequences of the COVID-19 pandemic with development policy, i.e. by encouraging the introduction of new technologies or new business approaches or improvement of existing technologies. The EU defines this goal with the motto for green and digital renewal.

Energy poverty. The combination of the maintenance of immovable cultural heritage buildings with energy rehabilitation reduces total greenhouse gas emissions, reduces energy poverty and also serves as a lever for "green growth". In the European Union, between 50 and 125 million people are not economically able to provide adequate thermal comfort indoors (EU Commission, 2020c). Many Member States recognize and monitor the socio-economic situation of energy poverty and its negative impact on serious health problems and social exclusion (Garcia *et al.,* 2009).

In a study entitled "Tackling Fuel Poverty in Europe, Recommendations Guide for Policy Makers" (Garcia et.al., 2009) cited by the European Commission, the authors state the following key findings: within the EU, only four countries have an official definition of energy poverty, namely France, Ireland, Slovakia and the United Kingdom (before 2019); energy poverty can be linked to low household incomes, high energy costs and energy inefficient homes, and can be solved by raising incomes, regulating fuel prices and improving energy efficiency in buildings; most national energy poverty reduction programs focus on income support programs such as fuel, heating and electricity subsidies; and lastly, that vigorous measures to renovate the homes of poor people solve the problem, leading to lower energy costs, improved thermal comfort and better indoor air quality (Garcia *et al.,* 2009). Investments in energy, static, aesthetic and functional rehabilitation of the cultural heritage buildings also falls within this framework. Namely, those investments also enable the reduction of greenhouse gas emissions (compared to new construction), and give county advantages in the differentiation (distinctive features) of the tourist offer and thus influence the increase of its quality. Insofar as cultural heritage objects are intended for the implementation of various cultural activities (halls, museums etc.), raising the quality of these objects also enables the improvement of working conditions for other cultural activities and thus for raising creativity in national economy.

Data and Methodology

Input-output analysis is based on statistical tables with data on the reproductive flow of domestic and imported goods in given industry and value added of this industry (column) and data on supply of products or services of this industry to cover the reproductive demand of the rest of the economy or to cover final consumption, including exports and, of course, investment in inventories (row). In the table, each industry has its own column and its own row. Based on this data, we can use linear algebra to estimate the combined direct and indirect effects of changes in the economic environment (such as increased demand) on output, value added, wages, depreciation and surplus, general government revenue, imports and inflation. The matrix also allows us to assess the needs for labor and capital (whether it is influenced by the utilization of these two factors of production). It enables us to assess the direct and indirect effects of a given change in the economic environment on emissions of various harmful substances and the like. With input-output analysis, we can estimate the production frontier by sectors of a given national economy in a given period. In this way, for example, we can assess supply “bottlenecks”. The advantage of input-ouput analysis over time series, cross-section or their combination (panel) in regression analysis is the robustness of the results, especially when we have data with a potential single root or series that are cointegrated (endogeneity).

If we want to take into account technological progress or adapting the economy by changing its structure, we

should use a dynamic input-output model in the analysis, made from input-output matrices for several consecutive periods (together at least 10 years). However, such a study goes beyond the purposes of the analysis in this article.

We consider that in the renovation of cultural heritage buildings, investor demands construction and other services, and the contractors then demand at their reproduction chain. Everyone in this chain (selected contractor, its suppliers of raw materials or related services, suppliers of these suppliers of raw materials and related services, and so on) have revenues which they share between variable work (employee benefits) and variable capital (depreciation and operating surplus) and pay from them various taxes.

In terms of the impact of income generated from variable work by the renovation of cultural heritage buildings on personal consumption, we take into account that employee benefits are taxed with personal income tax and contributions for employment, maternity care, health insurance and pension and disability insurance. Personal consumption is affected by the net disposable income of employees. At the same time, revenues from the contribution for pension and disability insurance are transferred directly to personal consumption as a transfer. The net income of the population is reduced by the saving rate. The difference represents personal consumption, which has, reduced by its import component, a multiplier effect on income and value added.

The growth of investment consumption in our analysis occurs due to an increase in corporate income from depreciation. At the same time, according to our assumption, the net operating surplus is fully invested: the operating surplus estimated by input-output analysis is reduced by the corporate income tax rate. We also assume that the household savings are invested in the financial system and in further real investments.

By definition, government revenues, as a basis for the growth of its consumption, represents the difference between the impact of construction activity on the restoration of cultural heritage buildings on value added that is reduced by input of employees, depreciation and operating surplus. These are taxes on production. The impact of direct taxes is assessed by the share of personal income tax and contributions for employment, maternity care and health insurance in employee benefits. To this we add the share of corporate income tax in the operating surplus. Together, these funds are collected through direct taxes and, according to our assumption, are used to cover the costs of public spending.

As mentioned we note that the part of personal investment and government spending is covered by imports. The direct and indirect impact of investment spending on the renovation of the Slovenian cultural heritage buildings is based on the mentioned economic variables in Leontief's input-output analysis (Leontief, 1951; Leontief, 1994, Babic, 1982; Bajt & Stiblar, 2019) and assessed by:

$$Mi = (I\text{-}Ad)^{-1} * Yi \quad (1)$$

$$Hi = (\text{diag } GDPi / Xi) * (I\text{-}Ad)^{-1} * Yi \quad (2)$$

$$Gi = Au * (I\text{-}Ad)^{-1} * Yi \quad i \quad (3)$$

$$Zi = (\text{diag } Fi / Xi) * (I\text{-}Ad)^{-1} * Yi \quad (4)$$

Mi is the global impact of increased demand (Yi) on output of industry i, and the sum (ΣMi) indicates the impact on the entire economy. Ad is a matrix of technical quotients and represents the share of reproductive consumption of a given industry covered by the supply of each of the industries in the domestic market in the production of a given industry (sum of reproductive consumption of domestic goods and services, corresponding imports and value added) and $(I\text{-}Ad)^{-1}$ represents matrix multiplier. Hi represents the global impact of increased demand on output of industry i (Yi) on value added or its components (employee benefits, depreciation and operating surplus), where the diag. of GDPi / X represents diagonalized matrix of the value added or its components (GDPi) in industry i divided by the production of this industry (Xi). Gi is the global impact of increased demand on output of industry I (Yi) on imports. Au is an import component of the technological matrix obtained by dividing imports into industries through their production. Zi is the vector of direct and indirect needs of the industry i for the services of a given production factor (labor, capital, R&D), Fi shows the number of employees or the net value of fixed assets in a given industry for the period in which the input-output matrix is estimated. Fi / Xi is the quotient of the number of employees (or the value of fixed assets or R&D investment) in an industry with the output of that industry, arranged in the diagnosed matrix. ΣZ is the sum of Zi of all 63 branches and shows the demand for labor, capital or research activity at the macroeconomic level.

Our assessment of the direct and indirect impact of investments (in the renovation of the cultural heritage buildings) on production (revenue), value added, employment of labor and capital, development activity and imports in the Slovenian economy is based on Leontief's production function and assumes constant production returns. We assume the elasticity of the substitution of production factors equal 0 and the homogeneity of production within sectors (Babic, 1982). Let us describe these assumptions a little more. The results of the input-output analysis show a snapshot of the structure of the economy over a period of time (one year). Due to the nature of the table calculation, the results of the analysis assume that an increase in labor and capital does not lead to rising returns (economies of scale) and then to declining returns, where an additional unit of labor (capital) leads first to increasing output and then to all lower production volume. Possible rising or falling returns could be estimated in a dynamic input-output model, which would include several input-output tables for consecutive periods. Finally, the assessment of the input-output matrix shows that each industry (sector) produces homogeneous goods with the same ratio between capital and labor (capital equipment of labor), with the same labor productivity (output per employee) and the same capital ratio (capital per output) and

that, during the measurement period, this structure does not change. This assumption can be mitigated by extending the input-ouput matrix to multiple sectors. It follows from all the above that the results of the input-output analysis can be understood as initial tendencies with the indicated direction.

Empirical Results

Slovenia has 12,478,382 m^2 of floor space in 35,135 buildings with the status of cultural heritage. At the cost of energy and other rehabilitation of these buildings at 1,000 euros per m^2, the total renovation investment amounts to 12.5 billion euros. We assume that the buildings at the end of the estimated period will also be renovated again, when they had already been renovated by 2020.

Fiscal effects are calculated from the estimated impact on GDP and 43.79 % of the average share of general government revenue (taxes and contributions) in value added. The results of our input-output analysis are in prices and by economic structure from 2015 and subsequently converted into prices in 2020. The factor is 1.0476 (SURS, 2021, b).

Sectorial Allocation, Energy Situation, and Socio-Economic Prospects of the Slovenian investments at cultural heritage buildings. Input output analysis of direct and indirect (multiplicative) effects of investments in the restoration of Slovenian cultural heritage buildings was assessed on the basis of data from the 63 sectoral input-output matrix of the Slovenian economy in 2015 (SURS, 2021 a). In that year, employee benefits amounted to 18,904.5 million euros (SURS, 2021 a). At the same time, the state collected 1,986.3 million euros in personal income tax, 30.9 million euros in employment contributions, 28.4 million euros in maternity care and 2,371.7 million euros in health insurance. Summing up the total of 4,417.3 million euros. General government revenues from the contribution for pension and disability insurance amounted to 3,519.8 million euros (UJP, 2016). We assume that as transfers they are transferred to the disposable income of the population. In 2015, the Slovenian population has a rate of 11.2% propensity to savings (SURS, 2021 c). The operating surplus in 2015 amounted to 6,676.1 million euros (SURS, 2021, a), and the Slovenian state collected 594.8 million euros in corporate income tax in that year (UJP, 2016). In 2015, direct imports covered 0.2177 household consumption, 0.2869 investment consumption and 0.0224 government consumption (SURS, 2021 a).

From the collected data, we estimate the share of disposable income of the population intended for personal consumption: 4,417.3 / 18,804.5 = 0.2349 (share of taxes and contributions in household income) and 1 - 0.2349 = 0.7651 (disposable income). We take into account the propensity to savings (1 - 0,112) = 0,888 and we get: 0,7651 * 0,888 = 0,6794. This is the share of the disposable income of the population that it spends on personal consumption. The share of direct imports is 0.2177, so that the share of household income intended for personal consumption covered by the domestic economy is (1 - 0.2177) * 0.6794 = 0.5315. The share of disposable income of the population intended for executed investments is 0.7651 * 0.112 = 0.0857. At the same time, we assume that 100 % of depreciation and operating surplus after deduction of corporate income tax are invested: 594.8 / 6,676.1 = 0.0891, i.e. (1 - 0.0891) = 0.9109. The investment consumption covered by the domestic economy is thus affected by total depreciation, 0.9109 operating surplus and 0.0956 employee benefits, reduced by 0.2869 share of imports in total investment consumption, i.e. (1 – 0.2869) * 0.9109 = 0.6496 of operating surplus and (1 – 0.2869) * 0.0857 = 0.0611 of employee benefits, as well as (1 – 0.2869) * 1 = 0.7131 of depreciation.

The increase in general government consumption is influenced by government revenues estimated in the input-output analysis of the impact of investments in the renovation of cultural heritage buildings as the difference between value added and employee benefits, depreciation and operating surplus. To this we add 0.2349 employee benefits and 0.0891 operating surplus, while taking into account the coefficient of direct import dependence of 0.0224. Both the analysis and potentially increased government spending include: (1 – 0.0224) = 0.9776 differences between the impact on total value added estimated by input-output analysis and the sum of this impact on employee benefits, depreciation and surplus, (1 – 0.0224) * 0.2349 = 0.2296 employee benefits and (1 – 0.0224) * 0.0891 = 0.0871 operating surplus.

The results of the input-output analysis on the mentioned assumptions and for one million euros' (2020 prices) investments in the renovation of the Slovenian cultural heritage buildings are for the entire economy shown in Table 1. The impact of investments in the renovation of cultural heritage facilities planned in the supplementary budget for 2021 and in the budget for 2022 are shown in Tables 2 and 3.

Table 1 shows that the increase in investment in the renovation of Slovenian cultural heritage buildings has a multiplier of 2.945. This is the effect of a change in spending on revenue. The impact on value added is 1,236. With one million investments in the renovation of Slovenian cultural heritage buildings, after the adjustment period, the revenue of the Slovenian economy will increase by more than 2.9 million euros, and value added by 1.2 million euros. Compensation of employees (salaries and other employee benefits) will increase by 0.7 million euros, operating surplus by 0.3 million euros and depreciation by 0.2 million euros. General government revenues will rise by more than 0.5 million euros. The analyzed investments will enable year-round work for 32 employees and the utilization of 3 million euros in fixed assets, while at the same time leading to 14,000 euros earmarked for research and development (R&D). Direct and indirect (through reproductive chain) imports of goods and services will increase by 0.5 million euros.

Table 1

One Million euros of Investment in the Renovation of the Cultural Heritage Buildings: Direct and Indirect Impact on the Slovenian Economy

	In millions of euros (in 2020 prices)	On Macroeconomic level (%)
Production - revenue	2.945	0.004
Added value	1.236	0.003
Employee benefits	0.675	0.003
Consumption of fixed capital	0.210	0.003
Operating surplus	0.297	0.004
Active workforce (number)	32	0.003
Fixed assets	3.021	0.002
R&D funds	0.014	0.002
General government revenue	0.541	0.004
Imports of goods and services	0.525	0.002

Source: SURS and authors' own calculations

More detailed overview by industry shows that with one million euros of investment in the renovation of cultural heritage buildings, value added will increase the most in construction (327 thousand euros), and over 10 thousand euros in the non-metals industry and in the production of metal products, trade, informatics, in various types of business consulting, in science and development services, in employment agencies, in public administration, education and health care. These are also industries where employment will increase. In construction, this effect achieves 17 jobs. In addition to construction, the return on capital (fixed assets) will be highest in real estate and public administration.

Chronological outline. The supplementary budget for 2021 and the budget for 2022 envisage 6.8 million euros and 7.5 million euros, respectively, for investments in the restoration of cultural heritage (Cerne, 2021). Table 2 shows that in 2021, after the adjustment period, these investments will lead to an increase in the revenue of the Slovenian economy by 20 million euros, and value added by over 8 million euros. Benefits for employees (salaries and other employee benefits) will increase by almost 5 million euros, operating surplus by 2 million euros and depreciation by more than 1 million euros. General government revenues will rise nearly 4 million euros. Investments in the restoration of cultural heritage will enable the work of 220 employees and the utilization of more than 20 million euros of fixed assets, while at the same time, leading to around 100 thousand euros intended for research and development (R&D). Direct and indirect (through reproductive chain) imports of goods and services will increase by almost 4 million euros.

Table 2

Planned 6.8 Million Euros Investments in the Renovation of the Cultural Heritage Buildings: Direct and Indirect Impact on the Slovenian Economy (Supplementary Budget for 2021).

	In millions of euros (in 2020 prices)	On Macroeconomic level (%)
Production - revenue	20.0	0.026
Added value	8.4	0.021
Employee benefits	4.6	0.023
Consumption of fixed capital	1.4	0.017
Net operating surplus	2.0	0.029
Active workforce (number)	220	0.023
Fixed assets	20.5	0.015
R&D funds	0.1	0.011
General government revenue	3.7	0.024
Imports of goods and services	3.6	0.016

Source: SURS and authors' own calculations

Due to the planned investments in the renovation of cultural heritage buildings in 2021, the value added in construction will increase by 2.2 million euros, by over 400 thousand euros in the public sector (public administration, education, health) and by almost 300 thousand in trade (wholesale, retail), and among industries by close to 100 thousand in the non-metal industry and by almost 80 thousand euros in the production of metal products. In construction, increased demand will enable the engagement of employees in 114 jobs, in trade in 17 jobs, and in the entire public sector in 24 jobs. The effect will also be noticeable in the engagement of 5 employees in agriculture, business consulting and employment services, and 4 employees in non-metal production and tourism. 5.7 million euros will be used in real estate, 4.7 million euros in construction, 2.3 million euros in public administration and 1.1 million euros in trade (fixed assets). In energy, this effect will reach almost 0.7 million euros, in the non-metals industry 0.6 million euros, and in education 0.5 million euros. Investments in research and development will be the largest in scientific and research services (26 thousand euros) and in education (17 thousand euros).

Table 3 shows the direct and indirect effects of 7.5 million euros of investments in the renovation of Slovenian cultural heritage buildings planned according to the budget for 2022 (Cerne, 2021, a). The results in Table 3 show that after the adjustment period, revenue in the Slovenian economy will increase by 22 million euros, value added by 9 million euros. Employees benefits (salaries and other employee benefits) will increase by 5 million euros, operating surplus by more than 2 million euros, and depreciation by just under 2 million euros. General government revenues will rise by over 4 million euros. 242 employees will be hired and almost 23 million euros of fixed assets will be used.

Investments in R&D will increase by about 100 thousand euros. Direct and indirect (through reproductive chain) imports of goods and services will rise by almost 4 million euros.

Table 3

Planned 7.5 Million euros of Investments in the Renovation of Cultural Heritage Buildings: direct and Indirect Impact on the on the Slovenian Economy (Budget for 2022).

	In millions of euros (in 2020 prices)	On Macroeconomic level (%)
Production - revenue	22.1	0.029
Added value	9.3	0.023
Employee benefits	5.1	0.026
Consumption of fixed capital	1.6	0.019
Net operating surplus	2.2	0.032
Active workforce (number)	242	0.026
Fixed assets	22.7	0.017
R&D funds	0.1	0.012
General government revenue	4.1	0.026
Imports of goods and services	3.9	0.018

Source: SURS and authors' own calculations

Again more detailed overview shows that in 2022, with the planned investments in the renovation of cultural heritage buildings, value added in construction will increase by almost 2.4 million euros, by 600 thousand euros in three parts of the public sector (public administration, education, health) and by almost 500 thousand in trade (wholesale, retail), and among industries by more than 100 thousand in the non-metal industry and over 80 thousand euros in the production of metal products. In construction, increased demand will enable the engagement of employees in 126 jobs, in the entire public sector in 27 jobs, and in trade (wholesale, retail) to 19 jobs. 6 employees will be engaged in agriculture and business consulting and 5 employees in employment and tourism services. 6.3 million euro will be used in real estate, 5.2 million euro in construction, 2.5 million euro in public administration and 1.2 million euro in trade (fixed assets). In energy, this effect will reach almost 0.8 million euros, in the non-metals industry 0.6 million euros, and in education 0.6 million euros. Investments in research and development will amount to 28,000 euro in scientific and research services and 19,000 euro in education.

Estimated by input output analysis and with the same methodological approach we used, these investments in the sum of the next decades would provide the Slovenian economy with 15.4 billion euros of added value (2020 prices), but also require 6.6 billion euros of direct and indirect imports. In the event that the renovation would run intensively for the next 40 years, this would mean 312 million euros of investment, and directly and indirectly the engagement of almost 10 thousand employees per year.

Conclusion

A change in autonomous demand affects the change in product by a factor of the inverse of propensity to save. In our paper we present the process of the impact of final consumption change on a product by applying the meaning of the autonomous consumption multiplier (Kahn, 1931; Pasinetti, 1991), renovation investments of immovable cultural heritage and the principle “do no significant harm”. The bad experience of the euro area with insufficient fiscal expansion during the last financial crisis (2008–2013) shows that in the face of an economic shock leading to a decline in demand, it is essential to increase one form of final consumption accordingly. This increase is, of course, in the nature of autonomous change. Given the pronounced developmental role of the state in the modern economy, it matters how and where state funds are placed within the framework of fiscal expansion or the increase in autonomous spending. The maintenance of immovable cultural heritage is an appropriate form of placing state funds to address the crisis associated with declining demand. Construction activity with a large multiplier affects employment and added value, while a maintained cultural landscape promotes tourism and has a positive effect on the well-being and self-image of the population living in a given place. The combination of the maintenance of immovable cultural heritage buildings with energy rehabilitation reduces total greenhouse gas emissions and also serves as a lever for "green growth".

The results presented in our paper are not Slovenian specifics. All European countries have a history and related architecture from the Middle Ages, Renaissance and Baroque. The maintenance of this heritage is part of a modern development policy.

Similar to Leontief (1951) and Kahn we introduced the multiplier of autonomous consumption, and with it the concept of the influence of the change in final consumption on production in the order of a series of subsequent periods. We derive this effect following Leontief's analysis of the impact of change in final consumption through the reproductive chain, where the supplier of the initial good needs input elements for its reproductive process as intermediate consumption, and its suppliers have this type of demand. In addition, we also take into account direct and indirect effects on personal, investment and government spending and repeat Leontief’s analysis of the direct and indirect effects of this induced consumption on the economy.

In our analysis of the Slovenian economy investments in the renovation of Slovenian cultural heritage buildings affect the revenue of the Slovenian economy by a multiplier of 2,945. The impact on value added is 1,236. With one million investments in the renovation of Slovene cultural heritage buildings, the revenue of the Slovene economy will increase by more than 2.9 million euros and value added by 1.2 million euros after the adjustment period. The analysed investments will enable year-round work for 32 employees and the utilization of 3 million euros in fixed assets. Direct and indirect (through reproduction chain) imports of goods and services will increase by 0.5 million euros.

The supplementary budget for 2021 envisages 6.8 million euros for the restoration of cultural heritage. After the adjustment period in 2021, these investments will lead to an increase in the revenue of the Slovenian economy by 20 million euros, and value added by over 8 million euros. Compensation of employees (salaries and other employee benefits) will increase by almost 5 million euros, operating surplus by 2 million euros and depreciation by more than 1 million euros. General government revenues will rise by close to 4 million euros. Investments in the restoration of cultural heritage will enable the work of 220 employees and the utilization of more than 20 million euros of fixed assets, while at the same time leading to around 100 thousand euros intended for research and development (R&D). Direct and indirect (through reproductive chain) imports of goods and services will increase by almost 4 million euros.

The budget for 2022 plans to invest 7.5 million euros in the renovation of Slovenian cultural heritage buildings. After the adjustment period, these investments in the Slovenian economy will have an impact of 22 million euros higher revenue and 9 million euros higher value added. Funds for employees will increase by 5 million euros, operating surplus by more than 2 million euros, and depreciation by just under 2 million euros. General government revenues will rise by over 4 million euros. 242 employees will be hired and almost 23 million euros of fixed assets will be used. Investments in (R&D) will increase by about 100 thousand euros. Direct and indirect imports of goods and services will increase by almost 4 million euros.

The value of total investments in the renovation of all buildings of Slovenian cultural heritage is 12.5 billion euros. In the coming decades, these investments could provide the Slovenian economy with 15.4 billion euros in value added (in 2020 prices) and lead to 6.6 billion euros in direct and indirect imports. As a main result, our paper encourages both EU and Slovenian government decision makers for substantial investments in the analysed field of cultural heritage.

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