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Tourism, welfare and income distribution: The case of Croatia

Abstract

This paper aims to investigate how a change of inbound tourism demand affects disposable income and household consumption and to provide a means of answering the question of wheatear tourism can be a generator of more equal income distribution. Changes in resident welfare caused by the growth of international tourism expenditure were measured by the equivalent variation. Simulation results showed that the expansion of tourism had a positive impact on the household welfare. However that impact was less than expected. It can be explained with the fact that production and exports in non-tourism sectors declined, which was indirectly reflected in the total household income. Among other, welfare loss occurred because tourist demand for goods and services was partly met by the increased imports and the fact that there has been a decline in the demand for labor in sectors not directly related to tourism. However, the growth in household income from labor and growth in household consumption, along with the fact that the growth of consumer price index was lower than the growth of real wages, has lead to a positive net effect on welfare. In addition to changes in the household welfare, the paper tried to answer the question of how the increase of inbound tourist demand affected the distribution of income. The distributional effects at national level measured by Atkinson index showed that inbound tourism can reduce inequality, but effects were much lower if Gini coefficient was taken as an indicator of inequality.

Key words: CGE model; tourism; welfare; income distribution; Croatia

Introduction

In small economies such as Croatia, international tourism is a significant source of foreign exchange earning and a generator of exports and employment. According to data from the Croatian National Bank, inbound tourism expenditure in Croatia in 2011 was 6.6 billion euro, which is almost 35% of revenue from exports of goods and services in the Croatian balance of payments. According to the results of a pilot study of the Institute for Tourism measuring the direct economic contribution of tourism for 2007, the share of direct tourism gross value added in overall gross value added of the economy was 8.5%, and the share of direct tourism gross domestic product (not taking into account the indirect and induced contribution of tourism) in total GDP was 8.3%.

However the negative effects of tourism in the economic and sociological context is often neglected. A high degree of tourism specialization of a country may adversely affect the competitiveness of non-tourism related sectors (Adams & Parmenter, 1995; Dwyer, Forsyth & Spurr, 2004), and consequently, cause a de-industrialization and increase in unemployment in other sectors. In addition, if the fixed

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factors of production are mostly foreign-owned, the profits will leave the country (Wanhill, 1994), and if it occurs to a great extent, the economy will be in a worse position than without tourism development. Among the non-economic effects it should be pointed out that the expansion of foreign tourism changes the culture and lifestyle of the local population and causes negative externalities related to the environment, affecting not only the local population but also recurrently the tourists.

According to some authors, investing in tourism accommodation is increasing the price of real estate (Sheng & Tsui, 2009; Cai, Leung & Mak, 2006; Jimenez, 2002), which then prevents a local population to purchase a property and has a negative effect on the development of small enterprises. An additional problem, the one readily visable in Croatia, is the polarization of the country on tourism oriented coastal area and non-tourism oriented continent. This, especially if occurring together with many years of de-industrialization and the tendency to monostructural economic development, raises the question of whether tourism can absorb labor supply surplus and the lack of revenue from exports. Also, leakages arising as a result of increased imports induced by tourism cannot be ignored. They are a function of three factors: tourist demand for imported goods and services, the share of imported intermediate goods in domestically produced final goods, and the size of imported component in the domestic intermediate goods (Gollub, Hosier & Woo, 2004).

Therefore, the aim of this paper is to apply Computable General Equilibrium (CGE) model in order to examine to what extent the growth of international tourism demand in Croatia effects the net welfare of residents and the distribution of income and, respectively, what is the impact of tourism measured by direction and amount of changes in these variables. Another specific objective of this paper is to improve the methodology for computing general equilibrium model in a way that the model includes equations related to tourism, taking into account the specificities of the Croatian economy.

The remainder of this paper is structured as follows. First, theoretical overview regarding tourism expansion and its impacts on welfare and income distribution is discussed. The literature review is followed by the empirical part, presenting the construction of Social Account Matrix for Croatia as the main data set for the model. The next section includes general description of the CGE model and the micro-model as methods for analyzing the economic effects of inbound tourism. The welfare and distributional simulation results generated by the model are also discussed, followed by main findings of the study and recommendations for further research.

Literature review

While most papers on the economic impact of tourism, among other things, dealt with the issues of welfare and poverty alleviation, analyzing distributional effects of tourism was not a frequent subject in theoretical and empirical studies. Copeland (1991), in his general equilibrium model, was among first who connected the impact of tourism with the paradox known in the literature as "Dutch disease", a concept previously developed by Corden and Neary (1982). He argues that the development of tourism in small open economies mostly affects the economy through changing terms of trade. In fact, foreign tourists mainly consume non-traded goods and an increase in their demand and, therefore prices, can cause appreciation of the real exchange rate (i.e. the ratio between the prices of traded and non-traded goods). Without tax and unemployment, the appreciation of the real exchange rate leads

to an increase in direct and indirect effects of tourism, which in turn increases welfare. However, because of the increased revenue and marginal product of labor, tourism becomes more attractive than other industries, attracting factors of production, especially labor, from other sectors. This, in turn, crowds out other export-oriented sectors, especially agriculture and industry, and this process can cause de-industrialization, excessive dependence on tourism and adversely affect the socio-economic and environmental aspects of the society. Such changes, according to Copeland, could ultimately cause immiserization and an uneven distribution of income, since tourism is subject to external influences significantly affecting international demand.

Hazari and Ng (1993) analyzed the relationship between tourism and welfare from the standpoint of changes in relative price due to the growth in exports. They suggest that not only tourists, but also residents, buy services and other non-tradables and that the increase in relative price caused by international tourism demand growth could reduce their welfare. The extent of that phenomenon depends on the shift of inbound tourism demand curve that occurs as a result of tourism development. Specifically, the authors state that with the presence of inbound tourism, prices in the domestic market do not only depend on the supply and demand of the local residents, but also on international demand, which may have the characteristics of a monopoly. The authors, however, do not take into account the change in the overall welfare of the population, but only one of its components which is caused by the influence of tourism on the rise in prices. In addition, they are also starting from a rather restrictive assumption that tourists do not buy imported goods.

Economic impact of tourism in Spain was analyzed by Blake (2000). Growth in tourist expenditure in his model led to the appreciation of the real exchange rate, which reduced non-tourist exports and increased overall imports. Effects on the total welfare were relatively small, amounting to only one tenth of the growth in tourist expenditure. Blake explains it with a fact that labor and capital used in the tourism industry would otherwise be engaged in other sectors, such as agriculture or industrial production. As a result, the amount of production factors in the economy does not change, only their productivity and their price increase.

Sugiyarto, Blake and Sinclair (2002) examined the economic and distributional impacts of partial and full globalization combined with the growth of international tourism demand in Indonesia. Additional international tourism demand in their model generated production and employment growth, but also led to an upward pressure on price level and domestic consumption. The combination of household income growth and improvement of the balance of trade increased welfare, although there has been a redistribution of income between rural and urban households. Simultaneous simulation of globalization and the growth of tourism demand showed that the expansion of tourism had a significant positive impact on the welfare and partial effects on income distribution.

The impact of tourism on welfare from the perspective of international trade under conditions of imperfect competition was examined by Nowak, Sahli and Sgro (2003) and Chao, Hazari and Sgro (2004). Both models with two traded and one non-traded sector showed that tourism expansion raises the relative price of the non-traded good. Increased revenues from tourism occurred because foreign tourists converted non-traded goods (primarily services) into tradable goods, causing price increases and improvement on the terms of trade. The intensity of that effect, as noted by Chao et al. (2004) will depend on three main factors: the degree of existence of externalities caused by tourism, changes

in the terms of trade through a rise in prices of non-tradable goods and the degree of resource movements, especially capital from the manufacturing sector.

Copeland's thoughts inspired, among others, Chao, Hazari, Laffargue, Sgro and Yu (2006) to examine the influence of "Dutch disease" on factor demand, prices and quantity of production in traded and non-traded sectors in the presence of externalities. Applying dynamic two-sector model, their results indicate that inbound tourism expansion leads to higher prices of nontraded good, resulting in a reduction of demand domestic capital demand and the decline of production in the export sector. The final net effect of tourism on welfare will therefore be less than expected, and if the loss incurred by de-industrialization and the externalities is higher than terms of trade improvement, welfare decreases.

Blake, Arbache, Sinclair and Teles (2008) investigated distributional impact of tourism in Brazil using CGE model. They showed that the increase of tourism demand affects the distribution of income via three channels: by rising prices of goods and services bought by households, trough growth of revenue from capital and by transferring additional government revenue from taxes to households. Welfare impacts have proved positive for the government, while the distributional effects were different depending on the category of households. Semi-skilled workers achieved the highest growth of real wages, while the return on capital was much lower, since the ratio of capital to labor in tourism industry is relatively low. Low-income households benefited the most from the earnings and price channel, while middle-income and high-income households benefited the most from the channel of additional government revenue.

Sheng and Tsui (2009) used a CGE model to examine the net effect of tourism on welfare in Macao, as an ideal example of a small country with limited carrying capacity. Their model includes the economic and socio-environmental externalities caused by tourism. The model shows a statistically significant correlation between the number of tourist arrivals and economic leakages in the form of import growth, real estate prices bubble, increased number of bankruptcies of local companies and reduced share of manufacturing sector in the economy and socio-environmental externalities, such as noise, the rate of mortality due to the air pollution and traffic accidents. The authors emphasize that the "occurrence of leakage rates vary from country to country, but in general, the less developed and smaller a country's human resources stock and manufacturing capacity are, the more capital, labor, and goods and services need to be imported, implying more leakage." (Sheng & Tsui, 2009)

Holzner (2010) conducted an empirical analysis on the existence of "Dutch disease" in the long run, which he called the "beach disease". Based on data from more than 130 countries, he tried to examine whether tourism oriented countries had less dynamic economic growth compared to those countries which were not tourism oriented. Econometric analysis of the long-term relationship between tourism, economic growth, real exchange rate, taxes and the manufacturing sector has shown that countries with a greater share of tourism income in GDP have developed faster, had a higher level of investment and lower exchange rate distortions, and the same results were confirmed by panel analysis. The paper concludes that tourism dependent countries have no danger of developing the "Dutch disease" in the long run, as it is indicative of the short and medium run.

Income distribution in the tourism industry is more unequal than the general distribution of income, as Lacher and Oh (2012) have proved empirically in the case of three coastal regions in the U.S. According to the results of their research, jobs generated by tourism expenditures had a lower income distribution

than the jobs in general. They conclude that tourism development strategy is suitable for regions with high unemployment, but not for regions with low unemployment. This is especially true in countries with high unemployment of younger segment, because although less paid, jobs in tourism rely on low-paying occupation and can reduce unemployment. Although this research is important in terms of analyzing the distribution of income in tourism industries, it does not address issues of causes and consequences of uneven distribution. In addition, the impact of tourism on economic growth is a result of a series of complex interdependent phenomena and it is not limited to the amount of labor costs.

Data sources

All data required to build a model was consolidated to form a Social Accounting Matrix (SAM)[1], which represents the snapshot of Croatian economy in the state of equilibrium. The need to form a Social Accounting Matrix arised from the fact that tourism is not a distinctive sector in the System of National Accounts and it is rather a phenomenon related to a large number of economic activities. The basic starting point of the model was the assumption that tourism is an activity primarily defined by the consumer at the moment of consumption, and as such does not exist on the supply side. Accordingly, Social Accounting Matrix for Croatia does not contain a sector that produces goods and services exclusively to tourists, and tourism is defined only on the demand side. The expenditure of domestic tourists is extracted from representative household account, while the expenditure of international tourists is derived from the rest of the world account based on the share of inbound tourism expenditure in different activities.

The latest data sources required to create a Social Accounting Matrix were the National Accounts, primarily Input-Output tables and Supply and Use tables (Croatian Bureau of Statistics, 1997, 2004), Household Budget Survey (Croatian Bureau of Statistics, 2004), Balance of Payment statistics (Croatian National Bank, 2005), Research on the Expenditure of International Travelers in Croatia and Croatian Travelers Abroad (Croatian National Bank, 2005), a Survey on Attitudes and Expenditure of Tourists in Croatia in 2004 (Institute for Tourism, 2005), the research Tourist Activity of the Domestic population in 2004 (Institute for Tourism, 2005), figures from the Government Budget (Ministry of Finance, 2004) and complementary data used to calibrate the model. The unemployment rate and average wages in the base year were drawn from the Croatian Bureau of Statistics (First Releases, 2005). The value of tourism demand price elasticity was derived from previous studies for Croatia (Stucka, 2002; Payne & Mervar 2002). Social Accounting Matrix was build for the latest available data for the year 2004.

The final matrix was built as a benchmark data set for the model and included the following columns and rows: 20 activities, 20 commodities, one representative household, firms account, government account, two types of factors of production, labor and capital, savings/investment account, international tourism account, inventory account and the rest of world account. The matrix was constructed simultaneously with the model's equations to include the characteristics and limitations associated with the National Accounts as a major source of data. Since benchmark data was expressed in value terms, to separate prices and quantities Harberger (1962) rule was adopted so all prices are normalized to unity in the benchmark equilibrium. Macro-structure of the Social Accounting Matrix is showed in Figure 1.

Figure 1
The structure of the macro SAM for Croatia

Receipts		Expenditure: (1) Activities	(2) Commodities	(3) Factors	(4) Trade and transport margins	(5) Households	(6) Firms	(7) Government	(8) Savings/ Investment	(9) Changes in stocks	(10) International tourism	(11) Rest of the world	TOTAL
Activities and production	(1) Activities		Domestic output delivered to domestic market								Tourism export	Non-tourism Export	Total demand
Activities and production	(2) Commodities	Intermediate inputs			Trade and transport margins	Household demand		Government demand	Investment demand	Inventories			Domestic demand
Activities and production	(3) Factors	Net value added										Factor incomefrom ROW	Factor income
Activities and production	(4) Trade and transport margins		Trade and transport margins										Trade and transport margins
Institutions	(5) Households			Labour and capital income			Transfers to households	Transfers to households				ROW transfers to households	Household income
Institutions	(6) Firms			Capital income				Subsidies				ROW transfers to firms	Firms income
Institutions	(7) Government		Net indirect taxes	Capital income		Direct taxes on income	Corporate taxes, social contributions					ROW transfers to government	Government income
Institutions	(8) Savings/ Investment	Depreciation				Households' savings	Operating surplus	Government savings				ROW savings	Total savings
Institutions	(9) Changes in stocks								Inventories				Changes in inventories
Institutions	(10) International tourism											Tourism export	Tourism export
Institutions	(11) Rest of the world		Import	Factor income to ROW		Transfers to ROW	Transfers to ROW	Transfers to ROW					Foreign exchange outflow
	TOTAL	Gross output	Total domestic supply	Factor expenditures	Trade and transport margins	Household expenditures	Firms expenditures	Government expenditures	Total investment	Changes in inventories	Tourism export	Foreign exchange inflow	

The building process included firstly the construction of the macroeconomic SAM with the basic sector aggregation.The macroeconomic SAM was then used to build more detailed, fully disaggregated microeconomic SAM. Since the microeconomic SAM was unbalanced due to various data sources, the cross entropy (Robinson, Cattaneo & El-Said, 2001) method was applied to balance the matrix. The resulting aggregated SAM for Croatia provided information on the on expenditure and receipts for all activities, commodities, institutions (representative household, firms, government, international tourist, other nonresident consumer), factors of production and other accounts (capital account, trade and transport margins).

Research methods

Computable general equilibrium model (CGE)

Multi-sector, static model for Croatia was constructed based on Löfgren, Harris and Robinson's (2001) standard computable general equilibrium model (CGE), modified with equations explicitly specifying tourism demand and with assumptions regarding the characteristics of Croatian economy, specifically unemployment.

The CGE model for Croatia was based on the Walrasian perfect competition paradigm, determining only relative prices. All prices, except those including taxes were defined relative to the GDP deflator, which served as the model *numeraire.* Model solving was based on constrained optimization. Producers were maximizing profit under the assumption that they are price takers and consumers were maximizing utility subject to their budget constraint. In equilibrium, market prices were such that demand equals supply for all markets and zero-profit conditions are satisfied for each of twenty industries. Model was calibrated to the previously described SAM for 2004. Since there were over 80 equations in the model, the following section describes only its most important components.

Production

On the supply side, twenty production sectors producing twenty types of commodities have been included in the model. The production technology was represented by a nested production function, explicitly incorporating the demand for intermediate inputs, labor and capital. Capital and labor were homogeneous and could freely move within the region. At the top level, domestic output was a Leontief production function of the composite intermediate input and total value added. Leontief function implies a fixed share of primary factors and intermediate inputs, and it is based on the assumption that their ratio is determined by the production technology, not by the decision of producers. Total activity on the first level was equal to the sum of the net value added, the value of intermediate goods and depreciation, expressed in price of composite investment good, representing a zero profit condition.

The value-added function was modeled as a constant elasticity of substitution (CES) function of capital and labor, allowing the producers to react on the changes of relative prices of factors of production by substituting them with other available factors. Composite intermediate input was a Leontief function of individually intermediate inputs. The model was based on the assumption that Croatia is a small open economy taking world prices as given. This allowed for flexible representation of the degree of

substitution between inputs to intermediate inputs and value-added in production process and between commodities in final demand. Factor demand and intermediate goods demand were derived by the optimization process of cost minimization subject to technological constraint.

The firms sector

Firms in the model receive income YF from sales of goods and services (in the SAM presented as income from capital where $shif_f$ is parameter of income from capital and PK_α and QK_α are the price and quantity of capital), receive subsidies and transfers from the government TRGF adjusted by the consumer price index CPI and receive transfers from abroad TRWF adjusted for exchange rate ER:

$$YF = shif_f \cdot \sum_i QK_\alpha \cdot PK_\alpha + TRGF \cdot CPI + TRWF \cdot ER$$

Firms expenditures include profits distributed to households, taxes, social security contributions and transfers abroad. The difference between total revenues and total expenditure is equal to non-distributed profits after tax, and is treated as savings:

$$SF = YF - tyf \cdot YF - tsf \cdot \sum_a QL_a \cdot PL_\alpha - TRFH \cdot CPI - TRFW \cdot ER$$

where *SF* is firms savings, *tyf* corporate tax, *tsf* rate of social contributions payed by firms, QL_α *and* PL_α the quantity and price of labor, *TRFH* transfer from firms to households, *TRFW* transfer from firms to ROW, and *CPI* and *ER* as described earlier.

Demand side of the model consists of household demand, inbound tourism demand, government demand, rest of world demand and investment demand.

The households sector

Representative household is maximizing ELES utility function subject to a budget constraint. ELES utility function was applied because it is assumed that at the first level household is satisfying subsistence level of consumption, and than its using the fixed proportion of disposable income in non-homothetic way. Representative household earns the income from capital and labor, and receives transfers from the government, firms and from the rest of the world sector. Households are allocating their income between income tax and social contributions if they are self-employed, and transfers to the rest of the world sector. Disposable income, left after that, is used for the consumption and savings. The changes in consumer welfare have been evaluated using the concept of Hicks equivalent variation (EV).

Equivalent variation measures the income needed to keep a household at the same level of welfare in the new equilibrium scenario as in the benchmark equilibrium. Therefore, it is equivalent to the amount of variation that needs to be added or subtracted from the initial income, and it is positive in the case of welfare improvement after the simulation, and negative in the case of reduction of welfare in relation to the benchmark equilibrium. Equivalent variation EV_h is described below, where PQ_i are aggregate consumer prices, PQB_i aggregate consumer prices in the benchmark period, REZ_h residual income, and $REZB_h$ residual income in the base period, which is defined as disposable income that remains after the household meets the minimum level of consumption:

$$EV_h = REZ_h \cdot \prod_i \left(\frac{PQB_i}{PQ_i} \right)^{\mu i,h} - REZB_h$$

The inbound tourism sector

Inbound tourism demand is considered on one side as an aggregate demand, on the other, as the demand for individual goods and services. Aggregate inbound tourism demand is defined as a CES function of aggregate tourism price index *TPF*:

$$ITD = \Theta^f ITDB \cdot \left[\frac{TPF}{ER} \right]^{\tau}$$

It is assumed that tourists have a constant and limited possibility of substitution between accommodation facilities, food, transport and other services. For example, tourists can substitute hotel and private accommodation, but can not substitute accommodation for food. In the above equation, *ITD* is a composite inbound tourist demand expressed as a function of the composite tourism price index *TPF*, which measures the travel costs in Croatia, and the exchange rate *ER*. The coefficient θ^f is a tourism demand shift parameter compared to the benchmark equilibrium demand *ITDB* (θ^f <1 indicates a decrease, and θ^f >1 increase in tourism demand), while τ is price elasticity coefficient of inbound tourism demand. Exchange rate refers to the annual average exchange rate of kuna against the euro in the benchmark period.

Composite tourism price variable is constructed as a Cobb-Douglas function of composite purchaser's prices of goods and services consumed by international tourists (hotels and restaurants, food and beverage, transport, culture, entertainment etc.). It is assumed that growth in international tourist arrivals in Croatia affects tourism demand for individual goods and services, influencing not only tourism prices, but also purchaser's price index.

Tourist demand functions for individual products can be derived based on constraint that the aggregate tourist expenditure must be equal to the sum of the individual tourist expenditures:

$$TD_i = \tau f \cdot \frac{ITD \cdot TPF}{PQ_i}$$

Parameter τf is percentage of consumption of each good in total international tourist expenditure, and the PQ_i composite consumer price for each industry. Data on the consumption of inbound tourists in Croatia in the benchmark period *ITDB* is based on previously mentioned researches carried out by Institute for Tourism and Croatian National Bank. Change of *ex-ante* level of tourism demand affects variable *ITD*, thereby changing the demand for individual goods TD_i. Through the variable *TPF* it will affect the level of change in consumer prices for services and hence the composite consumers price PQ_i and the demand for individual goods.

Other scenario is also possible, so the increase in prices of final products in the structure of tourism consumption, for example, consumer prices in the hotel industry, could lead to higher accommodation costs in the overall structure of tourist consumption. This will via previously described mechanism induce the decrease in tourism demand. It should be taken into account that the price paid by tourists

on goods consumed in the destination (hotels and restaurants, food and beverage, transportation, recreational, cultural and sporting services, fuel, etc.) includes tax and in that case increased tourism demand will not only lead to higher prices, primarily in the service sector, but also to the growth of government tax revenue.

The government sector

Government behavior was specified through the public expenditure and revenues. The government revenues consist of the taxes on intermediate and final consumption (VAT and excise duties), the taxes on production, the import tariffs, the taxes on household's income, the corporate taxes, income from the capital and the social security contributions. Income from net taxes on production consist of value added tax, consumption tax (sales tax, excise and other taxes on products) and import tariffs, where tq_i is net indirect tax except import tarrifs i.e. tax minus subsidies, PQ_i are aggregate consumer prices, QQ_i the aggregate quantity of products on the domestic market, tm_i is import tariff rate, M_i the quantity of import in the sector *i,* PWM_i is the world price of import, and the *ER* is the exchange rate.

Government also earns revenues from the households that consist of income tax *ty*YH* with income tax rate *ty* and social contributions of self-employed, the unemployed and employers, where *TSH* is social contribution rate paid by households and QL_α and PL_α are the quantity and price of labor. Government revenue from firms consists of corporate tax with a tax rate *tyf* and social contributions for employers, where *TSF* is contribution rate paid by employees. Parameter *shig* is government's share in income from capital, PK_α and QK_α are the price and quantity of capital, *TRWG* are transfers from the ROW, and *ER* is the exchange rate:

$$YG = \sum_i tq_i \cdot PQ_i \cdot QQ_i + \sum_i tm_i \cdot M_i \cdot PWM_i \cdot ER + shig \cdot \sum_\alpha QK_\alpha \cdot PK_\alpha + ty \cdot YH +$$
$$tsh \cdot \sum_\alpha QL_\alpha \cdot PL_\alpha + tyf \cdot YF + tsf \cdot \sum_\alpha QL_\alpha \cdot PL_\alpha + TRWG \cdot ER$$

On the other hand, government expenditure includes transfers to firms and to households, subsidies and consumption goods and services. The real expenditure of the government is determined from utility-maximizing behavior under budget constraints. The government is treated as a consumer of public goods and services, and is represented with a maximization of a Cobb-Douglas utility function:

$$MaxU(QG_i) = SG^{\alpha GS} \cdot \prod_i QG_i^{\alpha EG}$$

where αGS is government marginal propensity to save, α*EG* government marginal propensity to consume, *SG* is savings function and *QG* is function of government demand for goods and services.

The rest of the world sector

Domestic supply in the rest of the world (ROW) sector is modeled as a constant elasticity of substitution (CES) function of domestic and imported commodities. Producers decide to supply their output to international or domestic market according to constant elasticity of transformation (CET) function.

The model is based on the Armington (1969) assumption that domestically produced and imported commodities are not perfect substitutes, thus avoiding nonrealistic possibility of complete specialization emerging from Heckscher-Ohlin theorem, which assumes identical production and demand functions between countries. The Armington assumption solves the problem of cross hauling, or simultaneous import and export of the same good, which cannot occur under the classical assumption of perfect competition. Under the Armington (1969) assumption, domestically produced and imported goods are not homogenous, but have a different demand elasticity of substitution, called Armington elasticities. The external sector earns revenues from the import on domestic market, receives transfers from domestic institutions and saves. On the other hand, ROW buys exported goods and services, and pays transfers to domestic institutions.

The main equations related to ROW sector are demand for imports, demand for exports and balance of payment equations. Balance of payment as a record of all monetary transactions between a country and the rest of the world can be defined as:

$$\sum_i pwm_i \cdot M_i + WL + WK + TRHW + TRFW + TRGW = \sum_i pwe_i \cdot E_i + ITD \cdot TPF + LW + KW + TRWH + TRWF + TRWG + SROW$$

Deficit or surplus in the balance of payment's current account *SROW,* expressed in foreign currency, is the difference between total receipts from abroad: exports E_i valued at world prices of exports pwe_i, inbound tourism expenditure ITD*TPF, revenue from labor supplied to non-resident firms *LW*, capital income from abroad *KW*, transfers received by the households *TRWH*, transfer received by the TRWF, transfers received by the government TRWG and total expenditures: imports M_i expressed in world prices of imports pwm_i, the remuneration for labor from non-resident firms *WL* and for capital *WK* paid to ROW, and transfers to institutions abroad: TRHW, TRFW and TRGW.

Investment demand

Investment demand is modeled trough maximizing Cobb-Douglas utility function subject to the budget constraint determined by the sum of the depreciation, the household savings, the firm's savings, the government savings and rest of the world savings. It is assumed that the investment demand for every commodity is a function of the constant proportion of aggregate investment and aggregate consumer prices.

Saving is fixed in the model and the investment is adjusted to savings with the interest rates mechanism, which is not explicitly included in the model. That means that the model does not take into account the impacts of tourism demand on the level of savings, rather measures the impact of external shocks on expenditure expressed as the change in welfare.

Other equations

Other equations in the model include price equations and market clearing equations. Price equations include the prices of factors of production, value added prices, composite prices of intermediates, aggregate producers prices, aggregate purchaser's prices, prices of domestic products, export prices, import

prices, aggregate tourism prices, average real wage and price of composite investment goods. Market clearing equations describe the equilibrium conditions in the commodity and factor markets, trade balance, household's expenditure and income balance, current account deficit and income balance and savings and investment balance. Other equations include those defining real and nominal GDP, GDP deflator, consumer price index, and real exchange rate.

Model closure

Macroeconomic closure refers to specifying exogenous and endogenous variables of the several macroeconomic accounts: the current account, the government budget, savings-investment account and factor markets account. The current account is balanced by the real exchange rate. If, for example, the current account deficit falls below exogenously given level, it would lead to a depreciation of the real exchange rate, reducing imports and increasing exports. The government budget deficit is flexible, and direct taxes are fixed to ensure the equality between government expenditure and revenues reduced by the level of savings. To address the overall effects on household welfare, household saving is fixed, and wages are adjusted to ensure an exogenous level of savings. Unlike neoclassical representation of the labor market, the model allows for unemployment and thus attempts to show the picture of the real economy. Total labor supply is the function of real wage, and the connection between real wage and unemployment is introduced in the model with the wage curve (Böhringer, Ruocco & Wiegard, 2001).

Model calibration

Econometric estimation of a large number of parameters in a CGE model is a major task therefore it is common to adopt some of the parameters exogenously from the other research, and to identify the remaining parameters through the calibration procedure in the manner that CGE model replicates the data set represented in the SAM as an equilibrium solution. Unlike econometric estimation, calibration is a deterministic procedure of specifying parameter values on the basis of a single observation and it is used as a surrogate of the econometric analysis when data sources are limited. Accordingly, share parameters for the CES and CET functions are computed directly from the SAM in benchmark period. Other parameters such as elasticities of substitution between capital and labor, income elasticities, Armington elasticities of substitution between domestically produced goods and imported goods and elasticities of transformation between goods produced for domestic market and for the export are obtained from the GTAP database (Hertel, 1997, McDougall et al, 1998). Price elasticities are obtained from the previous studies for Croatia or from the GTAP database for other countries in transition. The wage elasticity and labor supply elasticity parameters were fixed according to published econometric researches of the wage curve (Davies & Rattso, 2000; Nijkamp & Poot, 2005).

Sensitivity analysis

The main goal of sensitivity analysis was to determine the sensitivity of model results to the values of calibrated and exogenously determined parameters. Sensitivity analysis was required because calibration procedure is based only on a single year data, which can bias the model parameters and influence on model performance. Secondly, since exogenously determined parameters were taken from previous research, or if not available, from the research for other countries, it was necessary to examine their

validity. Monte Carlo procedure was used to conduct sensitivity analysis. The use of that technique is based on the assumption that if model is solvable and stabile for chosen parameters, it will be solvable for the chosen interval of parameters. Thus, chosen parameters of the model were treated as random variables generated from previously defined uniform distributions. Deterministic computation was performed using n=100 simulations, and after aggregating the results of the individual computations, standard error was calculated. The results of the sensitivity analysis showed in Table 1 revealed that tested macroeconomic variables appeared to be robust to the choice of parameter values (results based on 95% coefficients of variation). Since only the macroeconomic variables subset was chosen as the most important for the model, the future analysis should include more detailed examination of all parameters and other variables as well in order to reveal which parameters have a considerable influence on the variance of the endogenous variables.

Table 1
Sensitivity analysis results (95% coefficients of variation)

	Simulation 1
Real GDP	0.52
Household expenditure	0.11
Domestic tourism expenditure	0.47
Tourism export	0.63
Non-tourism export	-0.40
Import	0.05
Government income	0.04
Labor supply	0.21
Unemployment	-0.10
Real wage rate	0.04
Real exchange rate	-0.08
Consumer price index	0.38

Source: Author simulation

Microeconomic model

To analyze the impact of inbound tourism demand growth on the distribution of income in Croatia microeconomic model was created and subsequently integrated into the CGE model. Bottom-up microsimulation approach was used as the reconciliation method. CGE model defined in the previous sections and micro-model were linked trough the price vector of commodities and factors, in a way that household income and expenditure were calculated in a microsimulation model based on price vector obtained in the macro model, while at the same time income in the CGE model was held constant. That process required a minimum modification of data and models. Another advantage of the sequential model is that it doesn't require the reconciliation of the micro level data with National Accounts data, and it should be taken into account that an expenditure break-down by products is identical to the macro model. Problems may be expected due to the harmonization of data from the household survey and from the SAM, which often differ as a result of the underground economy and differences in data collection methods.

For the purposes of micro-model, a representative household account in the matrix was created based on Household Budget Survey (2004) that included 2.847 households. After calculating expenditure and income at the household level, the resulting data was nested in the macro model to obtain a new vector of prices and to calculate the changes in welfare. The basic difference between the macro and micro model was in the coverage of data related to household's income and expenditure as all households and all commodities from the household survey entered the micro model and the macro model had only representative household that consumed its income on 20 commodities. Consumption vector was created at the micro level by summing the consumption of all households in the survey, and then it was used as input in the backward component of macro model. Because data from the microsimulation model directly entered the CGE model, there was no need for detailed breakdown by category of households in the main model.

The process of integrating the microsimulation model was done in several steps. First, the data from the household survey on expenditure and income was harmonized with the data from the SAM. Subsequently, data was aggregated to the level of a single household in a way that weights are assigned to every household in the survey. Then, the vectors of expenditure and income were constructed based on these data. Data on household expenditure on commodities in the household survey was divided into several categories: food and non-alcoholic beverages, alcoholic beverages and tobacco, clothing and footwear, housing and energy with imputed rent included, furniture and house appliances, health, transportation, communication, recreation and culture, education, services, hotels and restaurants and other goods and services with the total of 110 commodities, as opposed to the 20 commodities in the Social Accounts Matrix. It is evident from the above classification that the data from the household survey had to be aggregated into specific categories to match the activities in the SAM.

The discrepancy of the household survey data and national accounts data due to difference in methodology lead to unbalanced original matrix. Therefore, it was necessary to rebalance the matrix using cross-entropy method. Subsequently, the model was calibrated, data consistency in the new matrix was tested by checking the value of macroeconomic aggregates (GDP according to the product and expenditure approach) and the data for the representative household was replaced by the weighted survey data. After that, the model was solved and the existence of the benchmark equilibrium was tested once again.

Household income, expenditure and savings equations from the CGE model were applied in the micro-simulation model, and the income-expenditure balance from the 1st to the nth household can be defined in the same way as for the representative household by the following equation:

$$YD_h = \sum_i PQ_i \cdot CH_i + SH$$

Household demand was defined by maximizing ELES consumption function, whereby it is assumed that household primarily consumes subsistence commodities under fixed marginal propensity to consume. Households make optimal allocation of disposable income between consumption of commodities by maximizing ELES function subject to its budget constraint where YD_h is the household disposable income, PQ_i aggregate consumer prices, CH_i quantity of consumption and SH household savings.

The Gini coefficient and the Atkinson index were used to measure changes in income distribution. The Gini coefficient applied in the microsimulation model was defined as:

$$Gini = \frac{1}{2n^2 \cdot \bar{y}} \sum_{1=1}^{n} \sum_{j=1}^{n} \left| y_i - y_j \right|$$

where n is the size of the population, y_i the income of individual i, y_j the income of the individual j, and $\bar{y}$ mean income. To make the data required to calculate the Gini coefficient from the equilibrium period and the period after the simulation comparable, real income per capita (average disposable income deflated by the Consumer Price Index (CPI)) was calculated in a way that the average disposable household income was divided by the average household size according to data from the Household Budget Survey (2004).

Atkinson index measures the welfare loss caused by inequality in income distribution. Its value is equal to zero if income distribution is perfectly equal and than the inequality aversion parameter $\varepsilon = 0$. In that case, the same level of welfare is achieved after the variable change as with current distribution of income. Atkinson index (I) can be derived from data on average income $\bar{y}$, population n and individual inequality aversion parameter ε. Parameter ε measures the society's degree of sensitivity to inequality of distribution, and its value typically ranges from 0 to 2. If the parameter $\varepsilon \neq 1$, the Atkinson index is calculated as follows:

$$I = 1 - \left[\frac{1}{n} \sum_{1=1}^{n} \left(\frac{y_i}{\bar{y}} \right)^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}}$$

Atkinson index for the base year and after the simulation of growth in inbound tourism demand is calculated for the parameters $\varepsilon = 0.5$ and $\varepsilon = 1$, in order to take into account the different levels of the society's inequality aversion.

Research results

Table 2 reports the overall impact of an increase in international tourism demand expressed as percentage change of most important macroeconomic variables. The simulation was conducted on international tourism demand since it accounts for more than 90% of total tourism demand in Croatia. As a result of the increase in international tourism demand by 10% (Simulation 1), previously described equivalent variation increased by 1.75 billion HRK (about 0.5% of GDP). Simulation results revealed that the expansion of tourism had a positive impact on the welfare expressed as equivalent variation.

The equivalent variation measured in monetary units was positive, as a result of the growth of household income from capital and labor, which is partly shown in the growth of real wages. On the other hand, the relatively small increase in equivalent variation could be explained by a decrease in production and exports in sectors not directly related to tourism, which was indirectly reflected in the total household income. Specifically, the expansion of tourism caused changes in production, employment and producer prices, and had positive and negative impacts on sectoral performance. One part of the welfare loss in the model occurred because the growth in tourist demand for goods and services was

followed by increased imports, and by the fact that there has been a decline in the demand for labor in manufacturing sectors. The data showed that there has been a growth in Consumer Price Index, causing the tourism export to rise by less than 10%.

Table 2
Macroeconomic and welfare simulation results (% changes relative to the baseline)

	Simulation 1
Household expenditure	0.47
Domestic tourism expenditure	0.35
Tourism export	9.70
Non-tourism export	-1.40
Import	1.01
Government income	0.25
Real wage rate	0.92
Consumer price index	0.22
Equivalent variation (billion, HRK)	1.75

Source: Author simulation

The simulation impact on the income inequality is presented in Table 3. Gini coefficient in the base year was 0.29. Simulation of growth in international tourism demand by 10% (Simulation 1) showed a moderate effect on the Gini coefficient at the level of all households (-0.01 pp). The same impact with respect to the equilibrium period was slightly higher (-0.02 pp) when the Atkinson index was used depending on different inequality aversion parameters values. As expected, Atkinson index was higher the greater the inequality aversion parameter (-0.04 pp), since an increase in inequality aversion (ε) affects the sensitivity of the Atkinson index, especially at the lower income levels.

Table 3
Benchmark equilibrium data and changes relative to the baseline (percentage points)

	Benchmark equilibrium	Simulation 1
Gini coefficient	0.29	-0.01
Atkinson index (ε = 0.5)	0.07	-0.02
Atkinson index (ε = 1)	0.13	-0.04

Source: Author simulation

Analysis of changes in the level of welfare and income distribution at the national level, particularly those measured with Atkinson index showed that increase in inbound tourism demand, ceteris paribus, can reduce income distribution inequality.

Conclusion

Static CGE model and micro-simulation model were implemented in this paper in order to examine the short-term welfare and distributional impacts of international tourism in Croatia as an example of tourism dependent small open economy. Quantification of the economic effects of tourism could help the policymakers to adjust the existing economic policy in the direction of promoting tourism as a generator of economic growth, and to gain a better understanding of the significance of tourism on different levels of the economy. For the first time, the model evaluated the economic impacts of tourism in Croatia, and as such it could also be used for the purposes of industrial policy and development strategy of the Croatian economy.

CGE model has been developed in order to investigate the impact of the increase in international tourism demand on income, consumption and household welfare, and to address the question to what extent can tourism expansion reduce income inequality. As expected, the scenario of increasing international tourism demand by 10% had a positive effect on the household's welfare and moderate effects on income distribution. Therefore, tourism development benefited the individual households, but hasn't contributed significantly to the reduction of inequality. It can be concluded that economic development based exclusively on tourism without a simultaneous investment in manufacturing sector in the short term won't lead to significant improvements in the macroeconomic and microeconomic indicators.

The main limitation of the model is related to the availability of data, particularly the data on intermediate consumption and value-added. Furthermore, the lack of econometric research in Croatia that would result in estimation of elasticity coefficients as main parameters in the model is another constraint that resulted in drawing the data from other studies and databases for countries in transition. Although the sensitivity analysis showed a relatively high level of reliability of selected parameters, more detailed sensitivity analysis is needed in order to assess the robustness of the endogenous variables to the parameters values. Further research is needed for the econometric estimation of the income and price elasticities, Armington elasticity and other parameters that have considerable influence on the model results, and whose estimation exceeds the scope of this research.

Although the aggregate impact of inbound tourism on income distribution was low, more detailed results could be accomplished by disaggregating the households by residence (rural, urban), income or education level in order to show which household groups gain the largest benefit from tourism development. Since the model is based on the assumptions of perfect competition, the next step would be to incorporate the externalities in tourism sectors with characteristics of oligopoly or monopoly. Due to limited availability of data, especially updated input-output table, incorporation of recursive or intertemporal dynamic in order to examine the long-term effects of tourism is also left for future research.

Note:

[1]Social Accounting Matrix is micro-consistent data framework containing the values of all monetary transactions within an economy in a given period of time and demonstrating the flows of production, income and consumption.

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