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An Evaluation of the Factors of Maternity Tourism Demand: A Multivariate Approach

Abstract

Maternity tourism has become an increasingly important area of study in tourism and population economics in recent years. As Canada is one of the few developed economies that practices *Jus Soli*, this study investigates the determinants of maternity tourism in the country. To this end, the study applies the conventional tourism demand model to identify the factors that influence maternity tourism, including average income in priority markets, the real effective exchange rate, the number of obstetricians and gynecologists, the number of hospital beds, and the infant mortality rate. The study employs a recently introduced Fourier VAR model to examine relationships among these variables. The empirical results, based on impulse-response functions, show that higher-quality healthcare, indicated by more hospital beds and obstetricians, attracts more maternity tourists. Additionally, higher income levels in priority markets increase demand, while an appreciation of the Canadian dollar reduces maternity tourism. Variance decomposition analysis also shows that infant mortality is a critical explanatory factor, highlighting the importance of healthcare outcomes in shaping maternity tourism flows. These findings could help the government implement effective policies to promote maternity tourism.

Keywords: maternity tourism, tourism demand, Fourier VAR approach, Canada

1. Introduction

Maternity tourism is the practice of foreign citizens travelling to another country to give birth, often to access better medical facilities or lower healthcare costs. It is also called birth tourism, especially when it involves travelling to another country to obtain birthright citizenship (the right of a baby born in a nation to citizenship or nationality) or Jus Soli. Maternity tourism remains relatively low in many countries despite the several advantages it confers on the economy. Maternity tourism serves as an avenue to increase tourism receipts. In most cases, foreigners are charged more for healthcare services than their local counterparts. It also creates additional jobs in the healthcare sector of the host countries, as expansion in the healthcare sector requires the services of additional doctors, pharmacists, medical assistants, midwives, and nurses. It can foster reverse brain drain, as some nations have taken the opportunity of maternity tourism expansion to lure back to their home country medical professionals who had earlier moved abroad (Connell, 2006).

It also fosters expansion of local health infrastructure. Attempts by governments and private firms to attract foreign tourists are often linked to the upgrading of health facilities, thereby improving them. Maternity

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tourism also helps diversify the tourism markets of a host nation. Any negative shock to a well-diversified tourism market, arising from a health crisis or political disagreements with a few nations, is likely to have less impact on such a host country (Solarin et al., 2023; Raifu, 2024; Tang et al., 2025). Maternity tourism provides an avenue for the host nation to increase the share of the tourism sector in the aggregate foreign exchange earnings of host nations. This translates into higher foreign exchange reserves and an increased ability of the host nations to import essential goods and services (Cheng, 2016).

Promoting maternity tourism offers countries a way to increase overall tourism arrivals, particularly in the post-COVID-19 period, when many destination markets are still recovering. The COVID-19 pandemic caused a substantial decline in tourism arrivals. International travel nosedived by more than 70% in 2020, translating into 1.1 billion fewer tourists around the globe (World Tourism Organization, 2022). To return to pre-pandemic levels, several efforts have been introduced in numerous countries, including the promotion of tourism activities such as cultural and heritage tourism, business tourism, religious tourism, sports tourism and medical tourism, with a particular focus on maternity tourism.

Despite the obvious advantages of maternity tourism, several aspects of this type of tourism, including its determinants, have been ignored in the literature. The bulk of existing studies have focused on the determinants of aggregate tourism arrivals (Assaf & Josiassen, 2012; Chattopadhyay et al., 2022; Chioma Akinyemi, 2024). A few studies have also examined the determinants of other tourism activities, such as education tourism (see Abubakar et al., 2014; Lee et al., 2018; Matahir & Tang, 2018; Kim et al., 2020). To our knowledge, the only two studies that have evaluated the factors of maternity tourism are Cheng (2016) and Solarin et al. (2025a), which have focused on Hong Kong and New Zealand, respectively. The results derived from the Hong Kong and New Zealand datasets might not be generalizable to other host countries, as destinations differ and the factors affecting tourism arrivals in each destination vary.

The aim of the paper is to examine the determinants of maternity tourism in Canada for the period from 1991 to 2020. The first contribution of this study is the use of a standard tourism demand model to examine maternity tourism. The existing papers on the factors shaping the development of the tourism sector have chiefly used the tourism receipts trend or tourism arrivals trend to proxy the development of the tourism sector (Mushtaq et al., 2021). The second contribution of this study is to use Enders and Jones's (2016) methodology to investigate the determinants of maternity tourism. Among the advantages of the method is that it allows for multiple structural changes, can capture gradual breaks, and does not require testing the number of breaks. Several events have occurred across the world in the last three decades, including health crises, financial crises, and conflicts, which have negatively affected the tourism industry globally. During the years under observation, the world experienced the September 11 attacks of 2001, severe acute respiratory syndrome of 2003, and the global financial crisis of 2007-2009. These events have tremendous impacts on the tourism sector across the globe and thus must be accounted for in an analysis of tourism.

The third contribution of this study is that we have focused on Canada. There are several reasons for choosing Canada, including the fact that the country is one of the two G7 countries that have birthright citizenship, with the other being the United States. The country has been experiencing a rise in births to foreign citizens. According to Statistics Canada, maternity tourism increased by more than 17% between 1992 and 2000, and the figure rose by more than 66% between 2001 and 2020. The share of births by foreigners in the total birth count has been increasing in nearly all provinces in recent years (Brar et al., 2022). Maternity tourists come from both developing and developed countries to Canada. Under the 1947 Citizenship Act, all children born in Canada are automatically qualified for citizenship, except for the children of foreign diplomats. Hence, these exercises will reveal other possible motives for maternity tourism beyond birthright citizenship. These might serve as valuable inputs for the government to design good policies to boost maternity tourism that is devoid of the birthright citizenship motive.

In addition to addressing a notable empirical gap in the literature on maternity tourism, this study seeks to make a theoretical contribution by embedding maternity tourism within tourism demand. Traditional tourism demand models posit that international tourist flows are shaped by a range of economic, demographic, and structural factors, such as income levels in origin countries, relative prices and exchange rates, and destination attractiveness (Frechtling, 2001; Witt & Witt, 1995). We extend this framework to maternity tourism by accounting for the quality and capacity of healthcare infrastructure (number of obstetricians, hospital beds, and infant mortality rate) as critical dimensions of destination attractiveness. A particularly salient issue in this regard is the push–pull model of tourist demand, which theorises that individuals are pushed to travel by internal incentives and deficiencies in their origin environment, namely limited access to adequate maternal healthcare, and are simultaneously pulled by the perceived advantages offered by the destination, including superior medical infrastructure, safety, and institutional benefits. This motivational structure especially affects maternity tourism, in which expectant mothers may choose to travel abroad in pursuit of high-quality obstetric services, lower infant and maternal mortality risks, and legal or social incentives such as birthright citizenship.

The relevance of this framework is substantiated by Hu et al. (2024), who provide robust panel data evidence indicating that the quality of healthcare services constitutes a significant determinant of medical tourism flows. Their findings reveal that advances in healthcare infrastructure and service quality serve as strong pull factors that attract medical tourists to destination countries. In terms of maternity tourism, these insights suggest that advanced maternal healthcare systems and favourable birth policies are well-positioned to attract individuals from countries with less developed health systems. Furthermore, maternity tourism can be linked to tourism development through the quality of life in host destinations.

As argued by Woo et al. (2019), the quality of life in destinations, encompassing healthcare infrastructure, public safety, and environmental well-being, tends to make them more attractive to international tourists. This argument reinforces the proposition that the perceived quality of the healthcare system in a destination functions not merely as a utilitarian service input but as a critical determinant of its overall appeal within the tourism demand framework. Regarding maternity tourism, the presence of well-developed maternal health services and a supportive institutional environment conducive to safe childbirth significantly enhances the attractiveness of the destination. Integrating quality of life into conventional tourism demand theory offers a more detailed understanding of the determinants of travel behaviour, particularly in cases where motivations extend beyond leisure to include healthcare demand. Consequently, maternity tourism can be interpreted as a hybrid form of international mobility, driven simultaneously by the pursuit of superior healthcare services and broader assessments of destination quality as reflected in quality of life.

The remaining parts of this study consist of five main chapters. Section 2 presents the empirical literature that is focused on tourism demand, while Section 3 discusses the theoretical framework. Section 4 introduces the dataset and the modelling strategy. Section 5 exhibits the empirical results of this investigation, while the last section finalises the study.

2. Literature review

Maternity tourism has markedly increased in recent years, but scholars have rarely attempted to analyse the crucial factors driving the rise of this trend across the world. For instance, Cheng (2016) explored the factors of maternity tourism from China to Hong Kong from 1991 to 2011 using the Autoregressive Distribution Lag (ARDL) bounds testing approach to cointegration. The results of this study reveal a long run cointegration relationship between Chinese babies born in Hong Kong, the real GDP of China, and the bilateral exchange rate (Cheng, 2016). The findings also indicate that an increase in income and the depreciation of the local currency cause an increase in maternity tourism in Hong Kong. To the best of the authors' knowledge, except

for Cheng (2016), no quantitative study has examined the determinants of maternity tourism, and this is the only study that is like our study.

The past two decades have seen a rapidly growing body of literature on the determinants of tourism demand. In recent years, a substantial body of research has also examined health indicators of tourism demand. For instance, Assaf and Josiassen (2012) utilised Data Envelopment Analysis and Truncated Regression in their study of 120 countries over the 2005-2008 period. They employed the number of hospital beds and HIV/AIDS as health drivers of tourism performance. Their findings suggest that HIV/AIDS worsens tourism performance, whereas hospital beds enhance tourism demand. Bayrakcı and Ozcan (2023) focused on Turkey during 1996-2017. Their use of a panel cointegration test of Pedroni (1999) and Panel Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) specifications reveals a negative relationship between the death rate and visitor arrivals, indicating that a 1% increase in the death rate leads to a 1.12% decrease in tourism demand, but a positive nexus is found between the Human Development Index (HDI) and tourist arrivals. In a panel of 133 developing and developed countries, Cho (2010) sets up a social index, which involves HDI with life expectancy at birth, and examines the non- economic determinants of tourism demand. The study employs regression techniques and neural network analysis and finds that the social index is positively associated with tourism demand, suggesting that the higher the life expectancy at birth, the greater the tourism demand. Lee (2010) finds similar findings in a study of Singapore between 1980 and 2000 by applying an ARDL model. There is a long- run cointegrating relationship between tourism and healthcare, and the effect of healthcare on tourism arrivals is positive. This research uses doctors per 10, 000 total population as a proxy for healthcare. Naudé and Saayman (2005) studied a panel of 43 African countries from 1996 to 2000 to explore the determinants of tourist arrivals. They measured the health determinants of tourist arrivals using the death rate, life expectancy, and malaria rate. They use pooled cross-sectional OLS, panel data random effects, and first-step generalised method of moments (GMM) methods to conclude that the impact of malaria on tourist arrivals is statistically significant and negative, while the effect of the death rate on tourist arrivals is positive but statistically insignificant.

The strand of literature on the relationship between human development and tourism demand is gradually growing. This includes studies that focus on both developed and developing countries. For example, Mushtaq et al. (2021) focused on India during 1995-2016. Their Panel Autoregressive Distributed Lag (PARDL) specification shows that HDI leads to higher tourism demand. They employed the life expectancy of HDI as a human development indicator. Using Limited Information Maximum Likelihood (LIML) estimation over Poland, Croes et al. (2021) probe the association between tourism specialization, economic growth, and human development. They find that HDI, which contains life expectancy at birth, is positively but insignificantly associated with international tourist receipts and arrivals in the long term. Chattopadhyay et al. (2022) employ a panel cointegration test (Pedroni, 1999), a panel fully modified OLS estimator, a panel threshold regression analysis, and a panel causality test to inspect the nexus between human development and international tourism receipt in 133 countries during the period from 1995 to 2018. In their empirical study, they used the life expectancy of HDI as a measure of human development. The panel causality test results show a bidirectional causal link between HDI and tourism receipts. Like the research of Chattopadhyay et al. (2022), in a panel of 10 South American countries, the causal relationship between tourism competitiveness and human development was studied by Croes et al. (2020) utilising a panel causality test. However, their causality test results provide evidence of unilateral causality from tourism competitiveness to human development, whereas no causal relationship exists between life expectancy and tourism competitiveness. Different from Chattopadhyay et al. (2022) and Croes et al. (2020), Croes (2012) examined the causal relationship between human development and tourism spending on data from Nicaragua and Costa Rica in 1990-2009 by applying the Pairwise Granger Causality Test. Using life expectancy at birth of HDI as a human development indicator, this study finds a bi-directional relationship between human development and tourism spending

in Nicaragua, and unidirectional causality from human development to tourism spending in Costa Rica. Another study (Rivera, 2017) investigating the human development-tourism demand nexus obtained results like those of Croes (2012). Rivera (2017) centres on Ecuador, and the Granger causality test results conclude one-way causality between human development and international tourists, in which the causal relationship is from the former to the latter.

Some studies have examined the relationship between quality of life and tourism performance. For instance, Ridderstaat et al. (2016a) examined the relationship between tourism receipts and quality of life, accounting for the mediating effect of economic growth and applying the ARDL model to Aruba over the 1972-2011 period. The causality test results indicate that while tourism receipts have a weak causal effect on quality of life, quality of life has a strong causal impact on tourism receipts in the short run. Similarly, Ridderstaat et al. (2016b) examined the association between quality of life and tourism development using Structural Equation Modelling (SEM). Exercise and sleep hours were used as measures of quality of life. They found that tourism development has both direct and indirect effects on quality of life, whereas quality of life has only an indirect effect on tourism development through economic growth. Fu et al. (2020) examined the relationship between tourism demand, quality of life, and economic growth in Hong Kong from 1980-2016 using the ARDL model. They used the HDI, which includes life expectancy at birth, to measure quality of life. They found that quality of life has a statistically significant and positive impact on tourism demand. In their research on 83 economies over the period 2000–2016, Konstantakopoulou (2022) studied the effect of health quality on tourism receipts. The author constructed a Health Quality Index by combining life expectancy at birth, under-5 child mortality rate, lifetime risk of maternal death, government health expenditure, undernourishment, and tuberculosis death rate using Principal Component Analysis. They found that, for developing countries, life expectancy at birth and government health expenditure are positively associated with tourism receipts, whereas the under-5 child mortality rate, lifetime risk of maternal death, undernourishment, tuberculosis death, and the health quality index are negatively associated with tourism demand. Overall, their panel data specifications indicate that health quality plays a significant role in tourism receipts. Kubickova et al. (2017) explored the nexus between human development and tourism competitiveness, considering economic freedom, and applied panel VECM and instrumental variable specifications to a panel of 7 Central American countries from 1995 to 2008. Their measure of human development is the HDI, which covers life expectancy at birth. Their findings suggest a bidirectional causal relationship between the competitiveness of the tourism sector and quality of life.

Another strand of literature centres on the relationship between the pandemic and tourism performance. While some studies cover severe acute respiratory syndrome (SARS) (Tang & Tan, 2016), others (Rassy & Smith, 2013; Haque & Haque, 2018) focus on swine flu. However, Tang and Tan (2016) utilise a panel cointegration test (Pedroni, 1999) and a panel Fully Modified OLS estimator in an analysis of Malaysia for 1989-2010. Both studies find that the SARS pandemic is negatively and significantly associated with inbound tourist arrivals. In the same vein, Haque and Haque (2018) conduct a more focused study of Brunei for 2005-2010 using an Autoregressive Integrated Moving Average (ARIMA) model, while Rassy and Smith (2013) focus on Mexico for 2007-2009 employing OLS. As with the research of Tang and Tan (2016), they conclude that swine flu hurts tourist arrivals.

3. Theoretical framework

Within the standard tourism demand model, income of visitors is an important determinant of inbound tourism. An increase in income in the home nation has a positive effect on outbound tourism from the home countries and a positive effect on inbound tourism in the host countries. Higher GDP per capita increases the possibility of visitors to achieve their desire for fitness and health, relaxation and escape, social

interaction, and adventure. Moreover, mothers often need rest after childbirth, and this might be achieved by giving birth in a very far place. Therefore, an increase in income is expected to increase the inflow of maternity tourists.

Destination attractiveness is an additional factor that can determine inbound tourism demand (Frechtling, 2001). In the case of maternity tourism, health facilities can be used to represent the attractiveness of the destination. This is because the quantity and quality of health facilities in a destination country indicate the level of preparedness of such a destination to attract visitors for birth tourism and medical tourism (Han & Hyun, 2015). Many countries have spent several million dollars upgrading their health facilities (including personnel and equipment) to attract patients for medical and maternity tourism. These facilities are often conspicuously enumerated during the marketing programs of these destination markets to attract medical tourists, which also include maternity tourists.

Another possible factor is the health indicator in the destination countries (Frechtling, 2001). Infant mortality is a health indicator that reflects the quality of health systems in a destination country (and other indicators include deaths from HIV/AIDS and life expectancy), and it is likely to affect maternity tourism (Berbekova et al., 2022). Developed countries with better-quality health systems are known to have lower infant mortality (World Bank, 2023). The higher the quality of health systems, the lower the infant mortality and the higher the demand for maternity tourism. The cost of travel is one of several factors that hinder movement from the origin country to the destination. An appreciation of the local currency will make travel costs higher and discourage inbound tourism demand, all else being equal. Tourism demand may be more sensitive to exchange rates than to price-level changes (Witt & Witt, 1995).

4. Dataset and modelling strategy

4.1. Dataset

Due to data constraints, this paper uses annual data from 1991 to 2020. Maternity tourism, defined as the total number of live births in Canada to mothers whose place of residence is outside Canada at the time of birth, is sourced from Statistics Canada, the National Statistical Office of Canada. The real GDP (2015, dollar prices) per capita for the priority markets is the average real GDP per capita of the US, China, France, Germany, Mexico, Australia, Japan, South Korea, India, and the UK. Destination Canada (which is Canada's national marketing organization) has identified these as the markets that yield the highest returns on investment for tourism in Canada (Destination Canada, 2023). The data is drawn from the United Nations Statistics Division's *National Accounts - Analysis of Main Aggregates (AMA)*. The rationale for selecting real GDP per capita is that higher income tends to facilitate more tourism activity, including maternity tourism (Solarin et al., 2025a). Past studies with a similar independent variable include Solarin et al. (2025a; 2025b). The real effective exchange rate (REER) is the real value of Canada's currency against a basket of the country's 67 trading partners (in 2007 prices). The data is obtained from the *Bruegel Datasets Section* of the Bruegel AISBL Website. The reason for adopting REER as an independent variable is that the depreciation or devaluation of a nation's currency renders inbound international tourism (including birth tourism) less expensive (De Vita, 2014). Therefore, a depreciation or devaluation of a country's currency is likely to facilitate an increase in birth tourism. Studies that have adopted exchange rate as a determinant of inbound tourism include De Vita (2014) and Uzar and Yılmaz (2025). The number of obstetricians and gynaecologists (headcounts) and hospital beds (headcounts) are extracted from the *Organisation of Economic Co-operation and Development (OECD)* Statistics on the OECD Website and from Tully and Saint-Pierre (1997). The data for the infant mortality rate, which is the number of deaths per 1,000 live births, has been gathered from the World Bank, *World Development Indicators*. The reason for choosing health indicators as independent variables is that the nature of healthcare systems often reflects the level

of healthcare development of countries. International tourists usually consider the healthcare development of different countries before selecting their destinations (Sag & Zengul, 2019). Hence, improvements in health indicators' outlook are expected to boost the volume of birth tourism into a destination. Solarin et al. (2025a) have considered the role of health indicators' outlook on maternity tourism. All the series are transformed into their natural logarithm forms.

Table 1
Sources of the data

Variables	Description	Source
BTO	Maternity Tourism	Statistics Canada
TGDPPK	Average real GDP per capita of priority markets	National Accounts - Analysis of Main Aggregates
REER	Real Effective Exchange Rate	Bruegel Dataset
NOG	Number of Obstetricians and Gynecologists	OECD Statistics
NHB	Number of Hospital Beds	OECD Statistics, Tully and Saint-Pierre (1997)
INF	Infant Mortality Rate	World Development Indicators

4.2. Modelling strategy

Relying on the analysis in the theoretical framework development section, this study forms three basic models to examine the impact of health variables on maternity tourism in Canada. In the first model, we use the infant mortality rate as a health indicator. In the second model, this study utilizes the number of hospital beds, while the number of obstetricians and gynaecologists is used as a health indicator in the third model. The average real GDP per capita of priority markets and the real effective exchange rate are included in all the models as control variables.

Model 1. *BTO=f(TGDPPK,REER,INF)*

Model 2. *BTO=f(TGDPPK,REER,NHB)*

Model 3. *BTO=f(TGDPPK,REER,NOG)*

Vector autoregressive (VAR) models have been extensively used to examine the relationship between variables since the introduction of Sims' (1980) seminal paper. Based on the VAR model estimations, the variance decomposition, the impulse-response functions, and the Granger causality results can be produced. However, it can be noted that almost all variables might be affected by external shocks arising from political, economic, or social turbulence. Thus, structural breaks must be incorporated into models to avoid false inferences based on unreliable results. Therefore, to consider multiple structural breaks, Enders and Jones (2016) suggested adding a Fourier function to the VAR model. The proposed model can be represented as follows:

$$Y_t = \psi_0 + \psi_1 \sin\left(\frac{2\pi kt}{T}\right) + \psi_2 \cos\left(\frac{2\pi kt}{T}\right) + \sum_{i=1}^{p} \varrho_i Y_{t-i} + \sum_{i=1}^{p} \omega_i X_{t-i} + \varepsilon_{1t} \quad (1)$$

$$X_t = \Phi_0 + \Phi_1 \sin\left(\frac{2\pi kt}{T}\right) + \Phi_2 \cos\left(\frac{2\pi kt}{T}\right) + \sum_{i=1}^{p} \Theta_i Y_{t-i} + \sum_{i=1}^{p} \Lambda_i X_{t-i} + \varepsilon_{2t} \quad (2)$$

here p represents the optimal lag length which is chosen by SIC. X_t and Y_t have to be mean-reverting series according to their stationarity properties. In the equations, π is 3.141, k is the number of the frequency and takes the values between 1 and 5, t is the time trend, and T is the sample size.

This methodology has several advantages over traditional methods (Solarin et al., 2025b):

- It considers multiple structural changes rather than single changes.
- This approach can capture smooth breaks instead of sharp breaks.
- It is not necessary to predetermine the number of shifts.
- The method is not negatively affected by the number of breaks.

5. Empirical results

This investigation aims to examine the impact of health indicators on maternity tourism in Canada, covering the period 1991-2020. For this purpose, we use three main variables as health indicators: a) number of obstetricians and gynaecologists, b) number of hospital beds, and c) infant mortality. In addition, this study includes the average real GDP per capita of priority markets and the real effective exchange rate as control variables.

We employ a bunch of time series analyses to reveal the relationship among the abovementioned variables. First, the stationarity properties of the variables are tested through the Phillips–Perron unit root test. The empirical results are exhibited in Table 2 below. Empirical findings show that BTO, REER, INF, and NOG are nonstationary at the level, while TGDPPK and NHB exhibit mean-reverting behaviour. For the further steps of the analysis, we take the first differences of all nonstationary variables to avoid spurious regression.

Table 2
Phillips–Perron unit root test results

Variables	Test statistics	Variables	Test statistics
BTO	-1.315	*INF*	-2.376
ΔBTO	-4.775***	*ΔINF*	-4.052***
TGDPPK	-3.994***	*NHB*	-3.197**
REER	-2.245	*NOG*	0.484
ΔREER	-3.124**	*ΔNOG*	-3.360**

Note. *** and ** denote statistical significance at 1% and 5%, respectively.

Model 1, Model 2, and Model 3 are estimated through the VAR model extended with Fourier terms. The empirical findings of the impulse-response functions are displayed from the Figure 2 to Figure 4, while the empirical results of the variance decomposition are reported from Table 3 to Table 5.

Figure 1 shows that a one standard deviation (S.D.) shock to GDP increases maternity tourism in Canada. In addition, a one S.D. shock to REER, which reflects appreciation of the domestic currency, causes a decline in Canadian maternity tourism over the period examined. Lastly, a shock to infant mortality has a substantial and detrimental impact on maternity tourism. Table 3 shows the variance decomposition in the Fourier system for Model 1 over 10 years. It reveals that approximately 74% of the one-step forecast error variance of maternity tourism is explained by its own innovations, while the contribution of the INF variable is around 23%. In addition, the contributions of TGDPPK and REER are limited. Over longer periods, around 43% of the error variance is accounted for by infant mortality.

Figure 1
Impulse-response functions in the Fourier system for Model 1

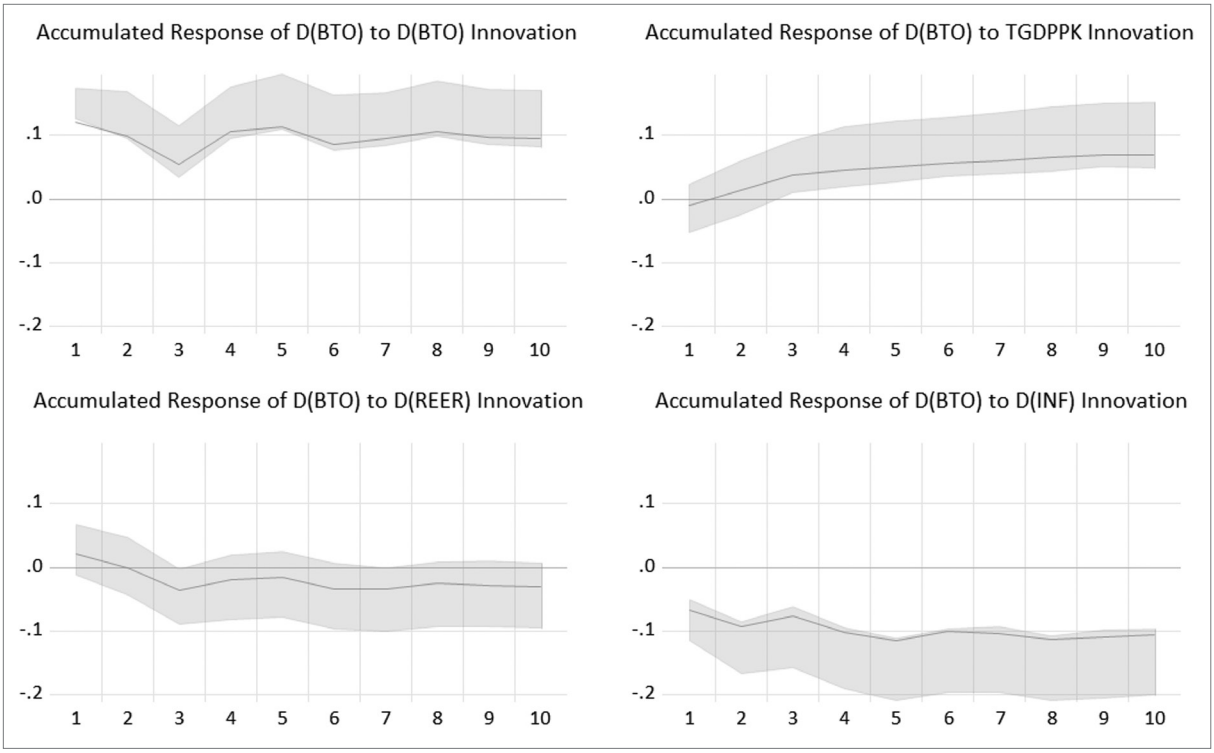

Table 3
Variance decomposition in the Fourier System for Model 1

Period	*ΔBTO*	*TGDPPK*	*ΔREER*	*ΔINF*
1	74.087	0.569	2.399	22.945
2	63.643	0.781	1.235	34.341
3	55.238	3.529	3.460	37.773
4	52.284	5.252	2.861	39.603
5	50.182	6.350	2.277	41.191
6	47.408	7.746	2.760	42.086
7	45.702	8.885	3.068	42.345
8	44.557	9.843	2.923	42.676
9	43.303	10.868	2.919	42.910
10	42.376	11.720	2.965	42.938

According to Figure 2, one S.D. shocks to per capita income and real effective exchange rate cause a similar response to the maternity tourism variable as in Model 1. In addition, a shock to the number of hospital beds has a big and positive impact on the Canadian maternity tourism. Table 4 presents the variance decomposition in the Fourier system for Model 2. This suggests that innovation explains approximately 69% of the one-step forecast error variance of maternity tourism. Besides, the contribution of the NHB variable to the forecast error variance of maternity tourism is around 19% in the shorter periods, while its contribution increases to 84% in the longer periods.

Figure 2
Impulse-response functions in the Fourier system for Model 2

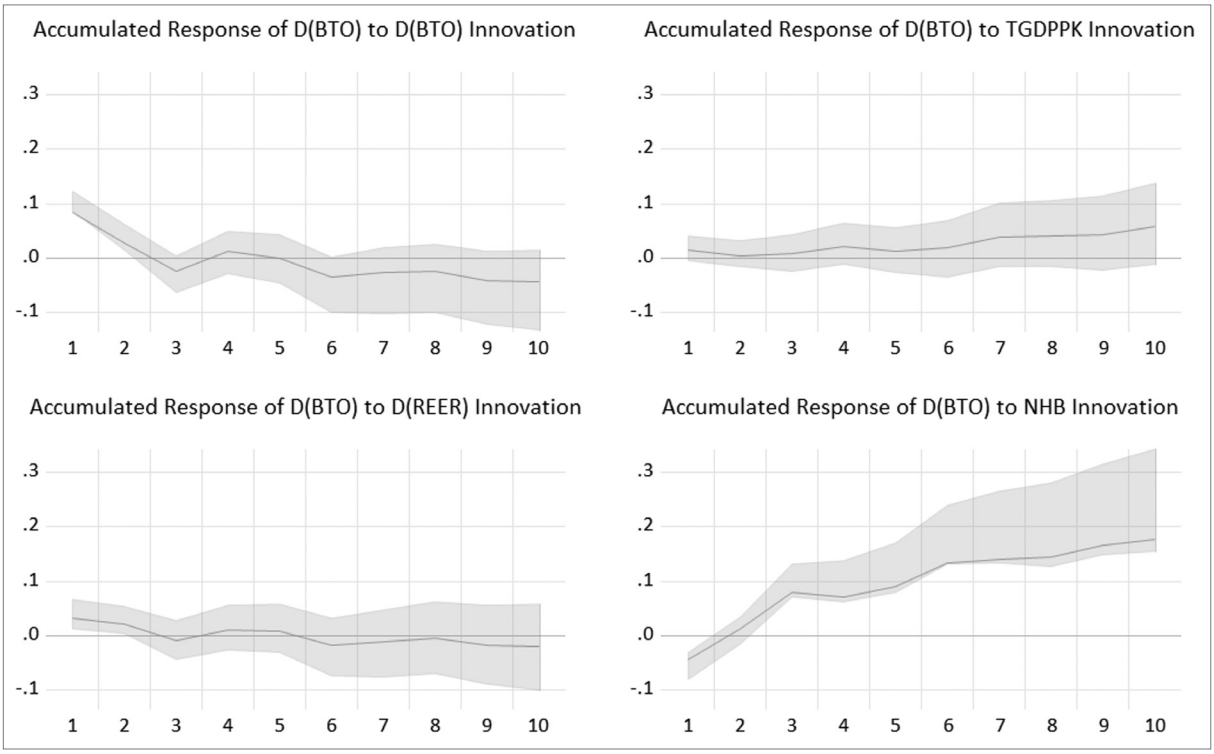

Table 4
Variance decomposition in the Fourier System for Model 2

Period	*ΔBTO*	*TGDPPK*	*ΔREER*	*NHB*
1	69.015	2.141	9.882	18.963
2	67.005	2.022	12.676	18.296
3	44.664	1.725	8.262	45.349
4	34.824	3.271	6.808	55.097
5	26.036	2.959	5.251	65.754
6	18.635	2.569	3.906	74.890
7	14.090	3.749	2.953	79.208
8	11.319	4.524	2.283	81.874
9	9.834	4.886	1.954	83.326
10	8.745	5.836	1.737	83.683

Figure 3 displays that the response of the BTO to the shocks in per capita income and REER are like the above findings. Besides, we can state that a one S.D. shock to the number of obstetricians and gynaecologists causes a rise in maternity tourism. Table 5 shows the variance decomposition in the Fourier system for Model 3. For the initial periods, BTO innovations contribute more than 86% to the forecast error variance of maternity tourism. Over time, its contribution decreases to around 77%. It is seen that the other variables' contribution is not remarkable. Especially, NOG as a health indicator has a little contribution to it, around 5.5% in the 10th period.

Figure 3
Impulse-response functions in the Fourier system for Model 3

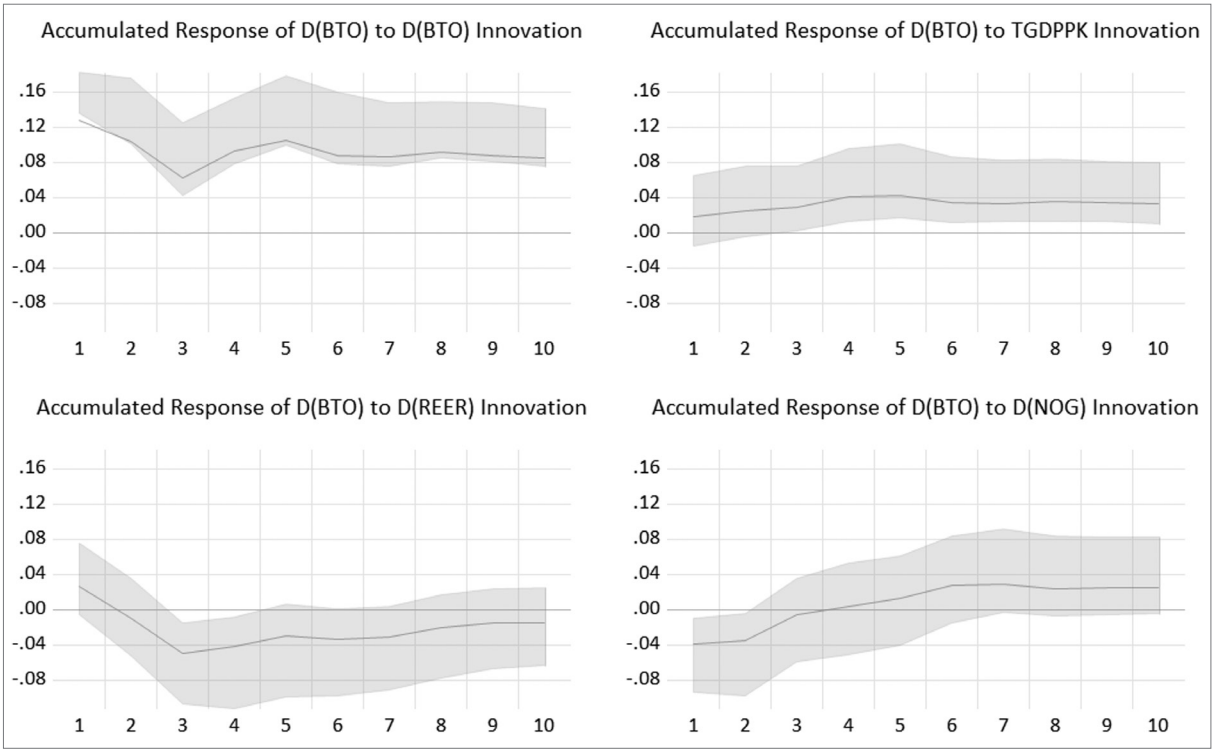

Table 5
Variance decomposition in the Fourier system for Model 3

Period	*ΔBTO*	*TGDPPK*	*ΔREER*	*NHB*
1	86.592	1.772	3.840	7.795
2	85.761	3.106	2.541	8.592
3	79.761	4.748	8.449	7.041
4	77.795	6.993	9.828	5.385
5	78.203	8.247	9.035	4.514
6	77.265	8.610	9.211	4.914
7	76.688	8.878	9.160	5.273
8	76.940	9.247	8.544	5.269
9	77.136	9.522	7.983	5.359
10	77.251	9.717	7.533	5.498

Overall, we can conclude that an increase in the average real GDP per capita of priority markets causes a rise in maternity tourism in the Canadian economy. That is, when the citizens of these countries get richer, they direct their resources toward giving birth in Canada. Besides, an appreciation of the Canadian dollar leads to a decline in maternity tourism because bearing a child becomes relatively more costly to foreigners. Lastly, empirical results show that better healthcare quality in Canada attracts more foreigners to give birth in this country.

In addition to the impulse-response functions and the variance decomposition results, this study also reports the Fourier Granger causality analyses in Table 6. There are some differences across the results of the causality tests across models; however, it can be demonstrated that the average real GDP per capita of priority markets

Granger causes maternity tourism in Canada, considering Model 1 and Model 2. Besides, the empirical findings show that there is a one-way causality running from the real effective exchange rate to the maternity tourism for Model 3. Among the health variables, only the number of hospital beds has predictive power on the maternity tourism in Canada for the period examined. In other words, any changes in the policies regarding the number of hospital beds in this country may affect maternity tourism negatively. Therefore, Canadian policymakers must be aware of the consequences of their health policies on tourism demand.

Table 6
Granger causality tests in the Fourier system

Model 1				
to / from	***ΔBTO***	***TGDPPK***	***ΔREER***	***ΔINF***
ΔBTO	-	8.578**	1.152	2.429
TGDPPK	5.347*	-	6.494**	5.018*
ΔREER	2.357	3.446	-	1.259
ΔINF	1.202	2.386	3.084	-
Model 2				
to / from	***ΔBTO***	***TGDPPK***	***ΔREER***	***NHB***
ΔBTO	-	28.215***	2.114	22.124***
TGDPPK	2.831	-	2.793	0.888
ΔREER	3.070	5.979*	-	1.093
NHB	0.673	0.609	2.496	-
Model 3				
to / from	***ΔBTO***	***TGDPPK***	***ΔREER***	***ΔNOG***
ΔBTO	-	3.255	4.624*	0.436
TGDPPK	8.920**	-	29.042***	30.175***
ΔREER	3.665	5.863*	-	1.069
ΔNOG	0.727	0.468	6.821**	-

Note. ***, **, and * denote statistical significance at 1%, 5%, and 10%, respectively.

The empirical results of this study agree with Cheng's (2016) findings, which suggest that the real effective exchange rate and per capita income have influenced maternity tourism. Besides, our results are partly consistent with findings obtained by Naudé and Saayman (2005), Cho (2010), Lee (2010), Assaf and Josiassen (2012), and Bayrakcı and Ozcan (2023). Their results show that health indicators affect tourism demand positively.

The results suggest that an increase in the average real GDP per capita in priority markets has a positive impact on growth in maternity tourism in Canada. The results are consistent with the standard tourism demand framework, which hypothesizes that an increase in income in the home countries triggers a rise in inbound tourism demand in the host countries. The results are also in line with the traditional theory of demand and suggest that maternity tourism is a normal service, rather than an inferior service. The empirical findings can be attributed to the fact that maternity tourism is costly, involving travel costs, accommodation, prenatal hospital bills, and post-natal hospital bills. Hence, there is a need for adequate income before travellers can embark on maternity tourism in other countries, including Canada. The higher the income, the greater the capacity to embark on maternity tourism.

The empirical results suggest that an increase in the real effective exchange rate leads to a decline in maternity tourism in Canada. The rationale for this result is that, with appreciation of the Canadian dollar, the relative cost of goods and services in Canada, including maternity tourism, increases. Maternity tourism involves stays of multiple days (and in some cases multiple weeks), and as such, tourists are likely to spend the largest share of their budget within Canadian territory and in Canadian dollars. This makes maternity tourism particularly sensitive to exchange rates. Unlike some countries, where the use of foreign currencies is allowed

as additional legal tender, the use of Canadian dollars is the dominant legal tender in Canada (although U.S dollars are also allowed in some cases). Hence, any appreciation of the Canadian dollar will negatively affect maternity tourism in Canada.

The results indicate that the healthcare system has a positive impact on maternity tourism in Canada. The quality of the healthcare system (including facilities, personnel, and service delivery) in Canada has been improving over the years and continues to draw more foreign women to give birth there. Urbach (2018) confirmed that most aspects of the healthcare system have improved in recent years, although waiting periods remain a concern. The healthcare system in Canada is among the best in the world and provides quality healthcare services for several purposes, including maternity tourism. According to McAlister et al. (2018), the healthcare system in Canada is ranked among the top 10% in a pool of 195 countries.

6. Conclusion

This study assesses the effects of health indicators on maternity tourism in Canada during the period 1991-2020. For this purpose, we utilise three main health indicators, namely the number of obstetricians and gynaecologists, the number of hospital beds, and the infant mortality rate. In addition, the average real GDP per capita of priority markets and the real effective exchange rate are used as control variables in this study. Methodologically, this investigation employs the Fourier VAR model of Enders and Jones (2016) to account for multiple gradual shifts in the models. We also present the impulse-response functions and the variance decomposition analyses based on these models. Empirical results of this paper confirm that Canada's superior healthcare system attracts more foreign women to give birth there. We also conclude that growth in maternity tourism in the Canadian economy is caused by an increase in the average real GDP per capita of priority markets. In addition, the empirical findings show that an increase in the real effective exchange rate causes a decline in maternity tourism in Canada for the period examined.

These findings raise an important question: why do individuals from other high-income countries choose Canada for maternity care? Although this study does not conduct a direct cross-national comparison of healthcare systems, a substantial body of empirical evidence indicates that Canada performs relatively well in maternal health outcomes and perinatal care accessibility compared with other high-income countries. For instance, Tikkanen et al. (2020) show that Canada has substantially lower maternal mortality rates and more equitable access to maternity care services than many of its OECD counterparts, including the United States. Complementing this, Lozano et al. (2020) highlight Canada as one of the strongest performers globally in maternal and neonatal health across countries with effective health service coverage. Canada's healthcare performance reflects not only the clinical quality of its obstetric care but also its broad accessibility and relatively equitable service provision. These comparative advantages suggest that Canada offers not only technologically advanced obstetric services but also a more inclusive and accessible maternal healthcare system. This contrasts with other developed countries, where structural fragmentation, socioeconomic inequality, or inconsistent regional service delivery may impede uniform access to high-quality perinatal care, even within otherwise well-resourced systems. In this regard, Canada's universal healthcare system and high institutional capacity in maternal care collectively enhance its desirability as a destination for maternity tourism. These factors may partly account for the observed preference among maternity tourists, including those from other developed nations, to seek childbirth services in Canada despite the availability of comparable technological capabilities in their home countries.

One implication of the foregoing empirical results is that factors beyond birthright citizenship propel maternity tourism in Canada. Not surprisingly, the source countries of maternity tourists in Canada include developed countries. Some expectant mothers from these developed countries (including the United States) do not move to Canada for birthright citizenship. To broaden the target market, more high-income countries

can be added to the current list of 10 priority markets in Canada. Including such countries should increase tourism arrivals, especially maternity tourism. The results also imply that marketing efforts for maternity tourism that focus more on richer countries should lead to a greater influx of maternity tourists into Canada. One of the post-COVID objectives of Destination Canada (the government-owned corporation responsible for marketing Canada as a desirable travel destination) is to target high-value guests using new global partnerships. Targeting high-value guests is consistent with our empirical findings, as richer countries have greater capacity to provide them, given their higher average incomes.

The empirical results indicate that maternity tourists are sensitive to exchange-rate movements. Hence, there is a need to consider a policy that guarantees a reduction in real exchange-rate volatility to which international tourists are exposed in Canada. Canada has used a floating exchange rate since 1970, and the system allows for monetary independence and therefore more flexible macroeconomic policy. However, a floating exchange rate is also susceptible to high volatility and overshooting, which might negatively impact the tourism sector, particularly maternity tourism. Excessive volatility can act as a restraint because it makes it more difficult for maternity tourists to plan their travel and accurately anticipate the future exchange rate. In the same vein, policies that lead to overvaluation of the domestic currency should be avoided.

Policymakers should implement policies to improve healthcare quality within the country to attract maternity tourism. For instance, they can focus on increasing the number of medical personnel and hospital beds in the country. For this purpose, they should increase public spending on the healthcare system. Also, additional efforts are required to improve the efficiency of both the public and private healthcare systems. Increasing facilities and personnel might lead to a fall in complaints by residents about maternity tourism. Complaints have arisen that the influx of maternity tourists has led to compromised care for local mothers-to-be and struggles for medical professional staff (Rahim et al., 2022).

This study has not explored several aspects of maternity tourism, which can be points of focus for future papers. For instance, the study has focused only on maternity tourism in Canada. Therefore, future studies can explore the determinants of maternity tourism in other destination markets. A panel data analysis across multiple countries can be conducted to enhance the robustness and generalizability of the results. There is also a need to assess the persistence of maternity tourism in different destination markets in future studies. Such analysis will reveal whether long-term measures or short-term strategies will be more appropriate to boost inbound maternity tourism.

Declaration of Competing Interests

The authors declare that they have no known competing interests that could have appeared to influence the work reported in this paper.

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