DOES TOURISM FOSTER HUMAN DEVELOPMENT? ARDL COINTEGRATION APPROACH ANALYSIS FOR UTAH

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ABSTRACT

This paper analyses the empirical cointegration, long-term and short-term dynamics between tourism, economic growth, and human development for Utah for the 1990-2018 period. The results from the ARDL analysis verified the existence of a long-term relationship between the variables. The Granger causality tests confirm unidirectional causation from tourism and economic growth to human development, while there is a bi-directional causality from tourism and economic growth. Furthermore, the results show that tourism has significant positive effects on human development in the long and short term. That implies that investment in tourism activities can serve as a tool for human development in the state of Utah. **JEL Classification:** C1, C32, O10

INTRODUCTION

The benefits of tourism for a country go beyond foreign exchange earnings. Tourism has been a significant contributor to the investment in infrastructure, the creation of direct and indirect jobs, and the generation of positive spillovers to the rest of the economy (Brida et al., 2016). In the case of Utah, the tourism industry has been growing, particularly since the Winter Olympics in 2002. In 2018, Utah became the first state to receive Michelin's three-star rating, placing Utah as "worth a special journey in itself" (Utah Economic Council, 2019). More advertising has caused a considerable impact on tourism, which was essential for its growth (Wrigley & Lewis, 2002). Because of tourism's growth, there has been an inherent and substantial increase in jobs and wages, which has supported Utah's economy overall. Nevertheless, economic growth does not always translate into human development, defined as enhancing the quality of life and population's well-being conditions (Biagi et al., 2017; Cardenas-Garcia & Pulido Fernandez, 201; Min et al., 2016). Therefore, this paper aims to find empirical evidence of the long-term relationship between tourism, human development, and economic growth for the 1990-2018 period.

Utah tourism generates ten percent of jobs in the region. In a diversified economy like Utah, revenues from tourism represent a resource that could become a catalyst for

human development. According to Cardenas and Garcia (2010), developed economies have better conditions to provide the right environment for a positive relationship between tourism and economic development. The present study seeks to demonstrate that the economic growth derived from tourism can improve the quality of life of the population of Utah. We argue that tourism revenues benefit from the region's economic conditions, creating opportunities to enhance human development.

The relationship between economic growth and tourism has been tested during the COVID-19 in 2020. Although our econometric analysis does not cover 2020, it is worth commenting on some statistics to show the impact in the first three quarters of 2020 for Utah's tourism sector. According to Utah's Governor Economic Report, the decline in the number of jobs lost during this period was 13.6% compared to 0.4% for other private sectors. Tax revenues from the tourism sector also declined by around 30% compared with 2019 (Utah Economic Council, 2021). The fall would have been more significant if the lockdown had started at the beginning of the ski season or had continued until June or July when Utah receives visitors for its five national parks. Thanks to a diversified economy, Utah was able to end 2000 with a positive growth rate above the national averages (0.1% compared to -3.5%). However, the pandemic revealed deficiencies in health and education that have not yet been fully resolved to date. As can be seen throughout the article, a region's economic conditions and infrastructure influence the leisure and hospitality sector.

The previous empirical literature on tourism and its effects on economic growth is categorized into two frameworks: the Tourism-led Growth (TLG) and the Economic-Driven Tourism Growth (EDGT) hypotheses. The TLG hypothesis came from the seminal work of Cantavella-Jorda (2002); they sought to verify the long-term relationship between economic growth and tourism revenues and assumed that the relationship's causality direction goes from tourism to economic growth. A series of empirical applications followed from this work, particularly for developing countries in which tourism plays an essential role in their economies (Eugenio-Martin et al., 2004; Brau et al., 2007; Belloumi, 2010; Arslanturk, Balcilar, & Ozdemir, 2011; Fayissa et al., 2011; Castro-Nuño et al., 2013; Min et al., 2016). Extensions of this framework resulted in analyses based on the EDTG hypothesis, where the causality direction goes from economic growth to tourism (Oh, 2005; Capone & Boix 2008; Eugenio-Martin et al., 2008; Sequeira and Maçãs-Nunes 2008; Tang & Jang, 2009; Yang & Fik, 2014; Antonakakis et al., 2015). Several works tested the TLG and EDTG hypotheses and found a reciprocal or bi-directional causality (Durbarry 2004; Kim et al., 2006; Lee & Chang, 2008; Tang, 2013; Ridderstaat et al., 2014), or the neutral hypothesis (Jackman et al., 2011; Kasimati, 2011; Georgantopoulus, 2013). Brida et al. (2016) offer a well-detailed review of these studies and conclude that, in most cases, the TLG hypothesis is confirmed, especially for less developed countries.

The study of tourism as an instrument for human development was based on the United Nations Development Program (UNDP) (UNDP, 1990). Alternative indicators to GDP were sought to establish the well-being of the population. These indicators are based on the theoretical framework of Sen's capabilities (1984), and for this, the Human Development Index (HDI) was built, which contains three variables that represent the well-being of the population in a country: health, education, and income. Based on Sen's approach, empirical evidence shows how tourism has provided an environment for the improvement of the population's living conditions (Croes, 2012; Sanchez et al., 2013; Cardenas-Garcia et al., 2015; Croes & Rivera, 2015; Biagi et al.,

2017; Cardenas-Garcia & Pulido-Fernandez, 2017; Rivera, 2017; Faber & Gaubert, 2018;). However, empirical evidence is much more limited and almost non-existent for the United States. Therefore, one of the objectives of this research is to fill this gap in the empirical literature analyzing the case of Utah.

The most appropriate conceptual framework to study the relationship between tourism, human development, and economic growth would be reciprocal hypotheses, where tourism affects economic growth and vice versa. It is postulated that Utah's economic conditions favor tourism. Even more, we seek to verify the hypothesis that tourism has a direct impact on human development so that it is not only through economic growth that we see a boost in human development conditions, but tourism can be a tool for these improvements.

Another contribution of this paper is the calculation of the HDI for Utah. There are two sources of information where there is data at the state level for the U.S.; however, both references have problems. The Measure of America (Lewis & Gluskin, 2018) has published data for some years. While Global Lab Data, an international organization, publishes data from 1990-2018, where some years are estimated. Therefore, we follow the UNDP methodology to calculate the HDI for the 1990-2018 period.

To assess whether there is a long-term relationship between tourism, human development, and economic growth, we follow the Autoregressive Distributed Lag (ARDL) cointegration framework. It has the advantages of robust results for small sizes and that variables do not need to share the same order of integration. Furthermore, we found that the previous empirical evidence for the analysis of tourism linked with human development or economic growth has been estimated using the Johansen-Julius cointegration approach, while there is a lack of evidence using the ARDL framework. Once the long-term and short-term dynamic relationships are confirmed, we proceed with the Granger causality tests to verify the causality directions. As indicated above, we expect that tourism creates economic growth conditions that translate into human development in Utah. Thus, the direction of causality goes from tourism to economic growth and economic growth to human development.

Confirming the long-term relationship between the three variables has implications of government policy towards the tourism sector that can change how this industry is promoted. Therefore, the contribution of this research is to establish the existence of a long-term relationship between tourism, human development, and economic growth. We believe that tourism can play a dynamic role in economic growth that transforms into improvements in the quality of life of the population of Utah.

The work structure is as follows. The second section discusses the previous empirical evidence regarding the TLG and EDGT hypotheses, focusing on the links to human development. In the third section, we describe the main characteristics of Utah tourism. In the fourth section, we present the variables and data. The fifth section shows the empirical model and the results. In the last section, we offer conclusions and notes for further research.

LITERATURE REVIEW

Tourism has been a source of foreign income resources for developing countries with weak economies but rich culture, heritage, history, and natural resources. For some countries, the tourism industry has been the most important sector of their

economies (World Economic Forum, 2019). Furthermore, tourism has been a tool for reducing poverty since it is a labor-intensive service sector. Hence, extensive empirical research on the tourism sector has focused on the effects of tourism revenues on economic growth. Nevertheless, it was necessary to empirically verify whether there was a long-term relationship between tourism expenditures and economic growth. Balaguer and Cantavella-Jorda (2002) questioned that for the Spanish economy, where tourism spending is an essential source of external income. The authors coined the term tourism-led growth (TLG) hypothesis based on the export-led growth hypothesis. Several empirical studies came after with the same objective. Brida et al. (2016) summarize approximately one hundred empirical works that seek to answer the same or similar question: is there a long-term relationship between tourism and economic growth? After revising the empirical studies, the authors conclude that evidence supports the existence of a long-term relationship between international tourism and economic growth.

Likewise, when the long-term relationship between the two variables is established, the next step is to verify the direction of causality: from tourism to economic growth, as proposed by Balaguer and Cantavella-Jorda (2002), or from economic growth to tourism as suggested by the EDTG hypothesis. Lin and et al. (2019) point out the need to examine the economic factors that determine why a region can experience TLG while other areas experience an EDTG. The authors use the Bayesian-probit models to explain the determining factors behind theTLG and EDTG hypotheses for a select number of regions in China during the 1978-2013 period. They find that less developed regions experience TLG. A similar conclusion is found for Latin American countries (Eugenio-Martin and et al., 2004; Fayissa and et al., 2011) and small developing countries (Neves & Macas, 2008; Chulaphan & Barahona, 2018).

Although developing countries can benefit from economic growth derived from leisure tourism, these benefits decrease as the country develops. Min et al. (2015) analyze the contribution of tourism at different development stages in an economy. They use the endogenous theory of economic growth to examine a panel of 55 countries that include low and high-income countries. They find that the stage of economic development determines the contribution of tourism. These findings can explain why tourism revenues could have a more significant impact for less developing areas than for developed regions. Furthermore, Adamou and Clerides (2009) claim that tourism's effect on the local or regional economy has a limit as an economic growth motor; once the limit is reached, more resources are required to achieve the same level of benefits.

Regarding causality, empirical evidence shows that the EDTG hypothesis predominates over the TLG. (Oh, 2005; Capone & Boix 2008; Eugenio-Martin et al., 2008; Sequeira and Maçãs-Nunes 2008; Tang & Jang, 2009; Yang & Fik, 2014; Antonakakis et al., 2015; Katircioglu, 2009). A city or region with tourist attractions can be appealing not only for its natural wealth or cultural heritage but for being a business or cultural center. The World Economic Forum (2019) called it the enabling environment as one of the critical factors of the Travel and Tourism Competitiveness Index (World Economic Forum, 2019). The EDTG matches better the experience of developed countries or regions where the infrastructure, services, safety, and security benefit the tourism sector and are accessible to all sectors of the economy. Therefore, the country's economic conditions indirectly favor tourism. Hence, economic growth policies that create infrastructure, improve public transport, and promote education

and safety will extend the visit for tourism reasons. For instance, Oh (2015) finds that economic expansion has led to the growth of tourism for South Korea and not vice versa. Lee (2008) finds similar results for analyzing tourism and economic growth in Singapore. However, it should be noted that the EDTG hypothesis has been criticized because of the different economic conditions of tourism destinations (Balaguer and Cantavella-Jordá 2002; Gunduz and Hatemi-J 2005; Lee and Chang 2008).

As indicated above, the previous empirical estimates confirm the long-term relationship between tourism and economic growth. However, it is essential to know the causality relationship between the two variables. After applying the VAR Granger approach, several studies conclude that the relationship is not unidirectional, from tourism to economic growth or vice versa, but reciprocal or bi-directional. In their review, Brida et al. (2016) show that the causality is bi-directional or reciprocal in 32 out of 100 studies. The correlation of the variables usually occurs more often when analyzing developing countries (large or small) and small, more developed countries. Other studies, such as Seghir et al. (2015), use the dynamic data panel approximation for 49 countries where the reciprocity hypothesis is confirmed for the 1988-2012 period.

The preferred methodological approach to verify the TLG or EDGT hypotheses has been the Johansen-Juselius (Johansen, 1988; Johansen and Juselius, 1990) reduced rank cointegration analysis and the Toda-Yamamoto (Toda & Yamamoto, 1995) procedure to implement the Granger causality tests. According to Brida et al.'s (2016) review, more than 80% of the publications used these frameworks. The ARDL cointegration, a more recent methodology, has been preferred over Johansen-Juselius because of its advantages in the robustness of the results for small samples and, variables do not need to be of the same integration order. It is worth noting that the empirical evidence based on the ARDL framework did so for developing countries; however, there is no evidence of empirical analysis for developed countries.

As we have seen, there is extensive empirical evidence to verify the long-term relationship between tourism and economic growth. Another research approach goes beyond economic growth and inquires whether tourism promotes the enhancement of quality of life, including health, education, decent income factors, or what is known as human development (Hummel & Van der Duim, 2012, Cardenas-Garcia, et al., 2015).

Studies related to tourism and human development began to rise with the expansion of the GDP's alternative indicators to measure a country's well-being. In that attempt, the UNDP built the HDI based on the theoretical framework developed by Sen (1984) on basic human capabilities. The HDI measures people's basic capabilities in three dimensions: a long and healthy life, measured by the life expectancy index, being knowledgeable, measured by the education index, and having a decent standard of living, measured by the Gross National Income (GNI) index. Once the three indexes are calculated, the HDI is found by taking the geometric mean of normalized indices for each of the three dimensions (UNDP, 2010).

Analogous to the TLG and EDLG hypotheses, the previous empirical evidence seeks to verify the long-term relationship between tourism and human development, measuring the latter as the HDI. For example, Biagi et al. (2017) examine the relationship between tourism and human development for a panel of 63 countries that include developing and developed countries, urban and rural areas for the 1996-2008 period. The HDI is modified to isolate the income component and only considers social factors such as health and education, which they call the social HDI. The long-term

relationship between the variables is confirmed. Still, they found that this relationship tends to be negative for the small developing economies, particularly for education variables, affecting culture or future employment opportunities for the youth. Thus, there can be positive economic growth in the long term, but negative externalities spill over education.

Several studies that examine the link between tourism and human development argue that this relationship is fulfilled as long as certain conditions are present (Sanchez-Rivero et al., 2013; Cardenas-Garcia et al., 2015; Cardenas-Garcia and Pulido-Fernandez, 2017). These studies point out that for tourism to be a contributing factor to the generation of economic well-being, the country or region must offer a suitable environment where the tourism industry would generate the production of local services and products. In this way, job creation, tourism revenues can be transformed into improvements in the quality of life. Under these conditions, economic growth due to tourism activity happens, essential to further economic development. According to Sanchez-Rivero et al. (2013), this objective may be more attainable for developed countries. They examined the case of 117 countries for the 1999-2008 period to determine which factors favor or hinder economic development. Countries are grouped into three sets of equal size according to different economic development variables and a series of explanatory variables of the tourism sector. It is shown that countries with more significant economic development obtain more benefits from tourism than those with a lower level of development.

Tourism influences economic growth, creating economic development conditions. For instance, Cardenas-Garcia et al. (2015) analyze a panel of 144 countries for the 1991-2010 period, using a Structural Equation Model (SEM). They verify that tourism-related variables explain economic development proxied by several variables such as the HDI, number of doctors, education, health expenses, and income per capita. The results show that tourism positively influences economic growth and increases economic development for more developed economies. However, it is non-existent for economies with little economic growth.

The economic conditions that influence tourism channeling toward economic development depend on the push and break factors. Cardenas-Garcia and Pulido-Fernandez (2017) categorize these factors (Table 1) in a sample of 144 countries.

The different categories listed in Table 1 covered the main areas that can influence tourism inflow in an area or region. Updated infrastructure conditions are critical for the resilient functioning of tourism activities. The lack of public spending on infrastructure can reduce the potential benefits of an attractive area for tourism. Another category in this list worth mentioning is foreign exchange. An open economy can be considered a push factor since it is one of the channels for innovation. If an area or region wants to keep competitive, it needs to update according to the foreign demand conditions. According to this list, Cardenas-Garcia and Pulido-Fernandez (2017) found that developed countries have twelve push factors. In contrast, developing countries only have five but have several brake factors, limiting tourism to become an economic development instrument. The authors argue that identifying these factors is essential for government policies since it is possible to establish measurements to reverse the brake factors.

Other studies focus on developing economies to examine the relationship between tourism and economic development (Croes, 2012; Croes and Rivera, 2015; Rivera, 2017). Based on the UNDP's human development framework, these

studies seek to verify if policies directed to the tourism sector, with public or private investments, create economic growth required to improve the quality of life in developing economies. Hence, the HDI variable is selected as a proxy of economic development. These studies analyze whether there is a long-term relationship with tourism for developing countries where tourism is critical for the economy.

From the TLG hypothesis framework, Croes (2012) studies the cases of Costa Rica and Nicaragua for the 1990-2009 period. He tests for cointegration and applies a VECM methodology to verify the long-term relationship between tourism and HDI. After the relationship is confirmed, he postulates the causality direction of the variables using the Granger causality tests. He finds that the causality is bi-directional or reciprocal in Nicaragua's case, while for Costa Rica, it is unidirectional where the TLG hypothesis is verified. Similar analyses are studied by Croes and Rivera (2015) and Rivera (2017). Both works start from the same human development approach, following Sen's (1984) capabilities theoretical framework of Sen's (1984) to analyze the long-term relationship between tourism and human development. They extended the hypothesis to verify whether the long-term relationship between economic growth and tourism changes into human development, what they call the virtuous circle of development. To that extent, the approach is similar to Cardenas-Garcia (2015) or Cardenas-Garcia and Pulido-Fernandez (2017). The analysis focuses on the necessary conditions for a country to translate the gains from tourism into economic growth and from there to economic development. The results for Ecuador show that the virtuous circle of development promoted by tourism cannot be confirmed. The Granger causality test shows the unidirectionality of the relationship between economic development towards tourism and economic growth towards economic development. Nevertheless, there is bidirectionality between tourism and economic growth.

In most cases, the literature review confirmed a long-term relationship between tourism and economic growth for developing economies whose comparative advantage lies in their natural and cultural resources. The TLG hypothesis is fulfilled in these cases. In contrast, developed economies or regions benefit from economic growth that drives tourism, so the EDTG hypothesis is verified. Beyond economic growth, the role of tourism in improving the quality of life of the affected population has been studied. In particular, since the per capita GDP has been questioned as an indicator of the population's well-being. Alternative indicators, such as the HDI, focus on human development such as health, education, and income. Therefore, when analyzing tourism revenues as a sector that benefits the economy, the question should be whether tourism can be the catalyst to improve a region or a country's human development. The revised empirical evidence does not show a conclusive answer in this regard. However, developed economies are expected to be better positioned to translate economic growth derived from tourism into advances in human development. This study is framed in the latter perspective, where we seek to verify whether tourism can serve as a sector where economic growth benefits lead to human development improvements in the case of Utah.

Previous research has not emphasized cases at the state level for developed regions with comparative advantages in various areas. Utah is an economically developed region with a diversified economy where tourism started to have a more significant role, particularly after the 2002 Winter Olympics. The state is emerging as a high-tech center. Furthermore, Utah is known for its religious heritage and its stock of national and state parks, all of which make it an interesting case to evaluate both the

TLG and EDGT hypotheses. We apply the ARDL cointegration approach because of the advantages mentioned before. To our knowledge, the ARDL has not been applied to analyzing the relationship between tourism and HDI for developed regions. The following section presents the main characteristics of tourism in Utah and the previous empirical evidence about the sector.

TOURISM INDUSTRY IN UTAH

Utah is known to have various recreational areas and activities and has been one of the top states for outdoor enthusiasts through the last couple of decades. Because of the state's numerous travel and tourism industry, jobs and income have generated a positive revenue inflow from taxes. Utah hosted the 2002 Olympic Winter Games, which created a new tourism pathway for the state. Utah's state officials and state businesses have been determined to capitalize on the state's tourism potential.

Utah is home to five national parks, forty-three state parks, two national recreational areas, one national historic site, and seven national monuments, along with some of the most attractive ski resorts, which total fourteen up to this year (Leaver, 2017). These state attractions have been a critical factor in bringing visitors from different parts of the country and the world to keep the tourism industry active. After the state hosted the 2002 Winter Olympic Games, visitation has been growing year after year (with a few downs attributed to the financial crisis of 2008 that expanded into the beginning of 2009). Finally, in 2015, the state set a record of national park visitations, which recorded $8.17 billion, from which $1.15 billion was generated in total state and local tax revenue. Along with those records, it has also been reported that Utah's tourism has generated approximately 142,5000 total jobs in 2015 and $4.28 billion in wages, which has positively impacted Utah's economy (Leaver, 2017). In 2018, Utah received Michelin's three-star rating putting the state in the category of destinations worth a special trip (Utah Economic Council, 2019).

Utah's population is mainly centered on the northern side of the state. While it has several attractions that incentivize tourist visitation, several of the biggest national and state parks are situated in the corners of the state's not-so-populated areas, composed of more scattered cities located in rural counties. Some of these counties count primarily on tourism to promote their financial activities. Leaver (2017) explained that rural counties such as Daggett County, the least populated county in Utah, had the largest leisure and hospitality share of total private jobs in 2016, ranking first statewide. Like Daggett County, several other counties heavily rely on tourism to promote investment. Hodur et al. (2005) explain that counties with small populations relying on seasonal tourism can improve significantly if particular importance is given to seeking the improvement of services to generate more employment. This becomes a decisive factor in the county's and state's economic development. Therefore, there could be a significant change in the well-being of citizens living in rural counties if their respective governments prioritize investment in areas that will further incentivize and spur tourism.

An example of how tourism has influenced Utah's economic development is the rural community of Springdale (pop. 457). Wrigley and Lewis (2002) stated that the town needed a full-time economic development director for the local chamber of commerce because of the active tourism industry (Springdale is next to Zion National

Park). Like Springdale, several other communities could experiment with a similar situation if more emphasis is given to counties that rely on tourism to improve their citizens' well-being by creating jobs and tax revenues from tourism to enhance the area's economic development. Several rural counties across the state, heavily dependent on tourism, rely on advertising to attract visitors more than other areas where advertising is unnecessary. Special recreational activities done in more extensive areas are already known by visitors who frequently return. The expansion of rural communities can significantly increase local businesses that can promote their residents' well-being to help rise in economic development in the long-term period.

There are certain areas in the state where the number of visitors depends on the time of the year. More visitors and residents travel across the state to visit national and state parks during warmer months due to the availability and services offered. However, Steed et al. (2014) found that central and southern Utah tend to receive fewer visitors because many of the southern parks close for several months of the year due to snowfall and safety reasons, which can negatively impact some counties' economic development. Visitors seeking certain activities may not visit central or southern Utah at certain times of the year.

In years before the Olympic Winter Games of 2002, and for some years after, Utah's tourism was not a priority as it is now. Utah's government has promoted tourism in the last couple of years, giving the industry a significant positive change. It has helped generate economic growth and create the conditions for economic development. Furthermore, the government's support for the games has improved the allocation of economic resources to enhance Utah residents' well-being in terms of health, education, and income. Wrigley and Lewis (2002) argued that some areas across Utah tended to rate tourism advertising more than other areas, suggesting that marketing tools and advertising campaigns were essential to promote tourism growth within the state. While the marketing campaigns helped boost tourism throughout the state, several rural counties did not incentivize tourist visitation as they expected.

In sum, the empirical evidence for Utah regarding tourism analysis as a source of human development is non-existent. There are studies related to the winter Olympics' economic growth effects in 2002 in Salt Lake City. Besides that, the studies related to tourism measure the sector's performance without a more in-depth analysis of the impacts of tourism on Utah's population's well-being. This study seeks to fill this gap in the empirical literature.

DATA AND METHODOLOGY

Considering the previous empirical evidence and the characteristics of tourism in Utah, this study proposes quantitatively estimating the long-term relationship between human development, tourism revenues, and economic growth. Like Croes and Rivera (2015) and Rivera (2017), we expect that in the case of Utah, tourism is part of a virtuous circle of development that goes from tourism to economic growth and from there to human development. Since Utah is an advanced regional economy, we argue that it has the needed enabling environment where tourism can generate income revenues for economic growth that turn into human development, especially since the 2002 Winter Olympics.

Variable Construction and Data

Since our analysis focuses on human development, this study is based on Sen's basic capabilities framework (1984). Sen points out that basic needs constitute a part of capabilities, but the term refers to something much broader. It has to do with the availability of options where people have the freedom of choice that also contributes to human well-being. From the capabilities approach, it is postulated that more freedom, and more choice, have a direct beneficial effect on well-being. Human well-being consists of developing people's abilities. Therefore, human development is about people achieving more things besides buying more goods or services. To that extent, we chose to calculate the HDI for Utah for the 1990-2018 period as the proxy variable for human development that we test with tourism revenues and economic growth.

As mentioned previously, the HDI was developed by the UNDP in 1990 and changed in 2010 (UNDP, 1990, 2010). The HDI comprises three composite dimensions: a health index, an education index and an income index. The life index measures the population's healthy life, with life expectancy as a proxy. The education index measures the population's knowledge, and it is measured by the average of two variables, the expected and mean years of schooling. The income index quantifies the standard of living of a given population, where the real Gross National Income (GNI) per capita is the proxy variable. Once these indexes are calculated, the HDI values result from the geometric mean of normalized indices for each of the three dimensions (UNDP, 2010). The index ranges from 0 to 1, one being the highest level of HDI. The UNDP reports the HDI on every country they can get the data from; however, not at the state level. In the United States, Measure of America (Lewis & Gluskin, 2018). calculates the American HDI for all states but not for consecutive years. The Global Data Lab from the Radboud University measures the HDI at the state level for several countries, including the United States; however, several years are estimated, reducing its reliability. Consequently, as one of this paper's contributions, we proceed to calculate the HDI for Utah (*hdiut*) for the 1990-2018 period following the UNDP methodology.

Figure 1 shows the values of the three components of the HDI (health, education, and income) on the left axis, and on the right axis is the value for HDI (*hdiut*) for Utah. As can be seen, education is the component that started at the lowest level compared with the other two, but after the year 2000, it fluctuated around the average. When the HDI is measured without income, it is also called the social HDI or the human capital HDI (Biagi et al., 2017), useful when focusing on the HDI's non-income components. In our case, we found that *hdiut* and *social hdiut* were highly correlated, and the econometric results did not change significantly.

As for the tourism variable (*taxrev*), we selected the taxable accommodation, leisure, and hospitality sales in Utah in millions of constant dollars of 2012. The proxy variables more commonly used in the empirical literature have been the number of visitors, spending, and accommodation. However, tourism revenues collected by the government are more appropriate to test the hypothesis of a long-term relationship between the three proposed variables because we link tourism services to the GDP. The variable for economic growth (*gdput*) is Utah's real GDP in millions of constant dollars of 2012. All three variables will be measured in logarithms.

The ARDL approach to cointegration

As shown in the literature review section, the most used test to verify the existence of a long-term relationship between two or more variables has been the Johansen-Jusileus cointegration test, which is only valid when all variables are integrated of the same order. However, as shown in the unit root tests, our variables of interest (*hdiut*, *taxrev*, *gdput*) do not show the same order of integration, and the number of observations is small. Hence, in this study, the econometric specification follows the ARDL cointegration model, initially proposed by Pesaran and Pesaran (1997) and extended by Pesaran et al. (2001). The model is considered *autoregressive* because the endogenous variable yt is explained, in part, by its lags, and it is *distributed lags* as it has a component of successive lags in the k explanatory variables x_j, t for j: 1,…, k. The ARDL cointegration approach has several advantages: it allows to identify long-term relationships for variables of mixed order of integration I (0) or I (1), it is super consistent in small sample sizes, it allows the estimation of short and long-term dynamics, and it possible to carry out the estimations even when there is potential endogeneity with explanatory variables (Pesaran & Pesaran, 1997; Pesaran et al., 2001).

The general form of the $ARDL$ (p, $q1$,…, qk) cointegration approach is as follows:

$$\Delta y_t = \alpha + \sum_{i=1}^{p} \beta_i \Delta y_{t-i} + \sum_{j=1}^{k} \sum_{i=0}^{q} \gamma_{j,i} \Delta x_{j,t-i} + \theta_0 y_{t-1} + \theta_1 x_{1,t-1} + \cdots + \theta_k x_{k,t-1} + \varepsilon_t \qquad (1)$$

Where εt is the random disturbance term is assumed to follow an independent and identically distributed process (iid). Some of the explanatory variables xj may not have the lag term in the model ($q = 0$). These variables are called static variables, while the variables with at least one lag are referred to as dynamic variables or regressors. The orders p and q are the lags of the dependent and independent variables, respectively. The appropriate values for the maximum number of lags can be determined through information criteria such as Akaike (AIC), Schwarz (BIC), and Hannan-Quinn (HQC).

To verify cointegration between the dependent variable y_t and the regressors x_j in equation (1), Pesaran et al. (2001) test the null hypothesis by applying an F-test for the joint significance of the coefficients of the lagged levels of the variables, that is, Ho: $\theta_0 = \theta_1 = \cdots = \theta_k = 0$ (no cointegration) versus the alternative hypothesis, H_A: $\theta_0 \neq \theta_1 \neq \cdots \neq \theta_k \neq 0$ (cointegration).

The F statistical test is tabulated using the critical values suggested by Kripfganz Scheneider (2018), where the regressors are mixed: I (0) and I (1). The lower limit of the critical value is assumed to be given by I (0), and the upper limit of the critical value is given by I (1). If the calculated F statistic falls below the lower limit of the critical value, Ho is not rejected, and it is concluded that there is no cointegration relationship. If, on the contrary, the F statistic exceeds the upper limit of the critical value, then Ho is rejected, and the existence of the cointegration relationship is concluded. If the F statistic falls between the lower and upper limits of the critical values, the test result is indeterminate.

The short-term dynamics are obtained with the estimation of the Error Correction Model (ECM) from the ARDL model, where the coefficient of the speed of adjustment

of the variables can be estimated in the event of deviations in the short term with respect to their long-term equilibrium levels. Rearranging the terms in equation (1), we will obtain the relationship of the ECM of the ARDL model:

$$\Delta y_t = \alpha + \sum_{i=1}^{p} \beta_i \Delta y_{t-i} + \sum_{j=1}^{k} \sum_{i=0}^{q} \gamma_{j,i} \Delta x_{j,t-i} + \varphi ECT_{t-1} + \mu_t \quad (2)$$

ECT_{t-1} is the residual of the long-term equilibrium relationship. The coefficient φ represents the adjustment coefficient in the short term between the endogenous variable and its regressors due to deviations in their long-term equilibrium levels. The sign of φ is expected to be negative if the deviations presented by the variables are corrected with respect to their equilibrium levels.

Several diagnostic tests are conducted to verify the goodness fit of the model. For instance, Breusch–Godfrey test for serial correlation, Breusch-Pagan, and ARCH for testing heteroskedasticity, Jarque–Bera to test normality, RAMSEY for omitted variables, and the cumulative sum (CUSUM) and CUSUM square tests to check the stability of the parameters. As a robustness estimation, we estimate the Fully Modified OLS (FMOLS) for the three variables to confirm equilibrium's long-term relationship.

Granger Causality Test

The final step in the analysis is to establish the direction of the causality of the cointegrated series. The approach of Engle and Granger (1987) is followed. We can test for the absence of Granger causality by estimating the following VAR model:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \cdots + \alpha_p y_{t-p} + \beta_1 x_{t-1} + \cdots + \beta_p x_{t-p} + \mu_t \quad (3)$$

$$x_t = \gamma_0 + \gamma_1 x_{t-1} + \cdots + \gamma_p x_{t-p} + \delta_1 y_{t-1} + \cdots + \delta_p y_{t-p} + \vartheta_t \quad (4)$$

The causality contrast of Engle and Granger is based on the estimation of a VAR model for two variables, so it is accepted that Y depends on X if the joint nullity hypothesis of the coefficients of the delayed values of X in the equation of Y (eq. 3), and it is accepted that X depends on Y if the rejection of joint nullity refers to the delays of Y in the equation of X (eq. 4).

According to the above, in the following section, we estimate the ARDL cointegration model and the Granger causality test for the variables of interest.

Empirical Estimation and Analysis

Unit root tests

Even though the ARDL model can be estimated with variables of mixed order of integration, Pesaran et al. (2001) indicated that the bound test is not valid for I(2) variables, so a unit root test is still needed to ensure none of the variables are I(2). Thus, to check the order of integration of the variables, we apply the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and the Zivot-Andrews tests to check structural

integrity breaks; three tests will be used for the variables in levels and first differences. According to the ADF test case, the optimal number of lags is chosen in the Akaike Information Criteria (AIC). In PP's case, the optimal range is selected according to the Newey-West method using Bartlett Kernel for the spectral estimator. We include the Zivot-Andrews (ZAndrews) test to verify structural breaks for the 1990-2018 period.

Table 2 shows the results for the three variables in levels and differences with and without trends with 1%, 5%, and 10% probability. As can be seen, not all three variables contain a unit root; it is rather evident for *ltaxrev* where we reject the non-stationarity null hypothesis, with or without a trend when the variable is in levels. The other two variables, *lhdiut*, and *lgdput*, seem to be stationaries at levels when the Zivot-Andrews test is performed. Likewise, the non-stationary null hypothesis is rejected when the variables are in first differences or, in other words, they are stationary of order zero I(0), with or without trends. We do not find any I(2) variables, so we can proceed with the ARDL bound limit cointegration tests.

ARDL Cointegration Model

The function form for the proposed relationships is as follows:

$$lhdiut = f(ltaxrev, lgdput, \varepsilon_t) \quad (5)$$

This paper assumes that human development is positively affected by tourism revenues and economic growth. We expect that tourism revenues play a role in human development through the economic growth generated from all touristic activities and create better living conditions in Utah. Since there is a suspected endogeneity between the variables, and the variables are of mixed integration order, we proceed with the ARDL cointegration approach to verify the long-term equilibrium relationship. The specification form is as follows:

$$\Delta lhdiut_t = \alpha + \sum_{i=1}^{p} \beta \Delta lhdiut_{t-1} + \sum_{j=1}^{q} \gamma_1 \Delta ltaxrev_{t-1} + \sum_{j=1}^{q} \gamma_2 \Delta lgdput_{t-1} + \theta_0 lhdiut_{t-1} + \theta_1 ltaxrev_{t-1} + \theta_2 lgdput_{t-1} + \vartheta dum + \varepsilon_t \quad (6)$$

The θ coefficients represent the long-term relationship that we will test using the F statistical test, while the γ coefficients represent the short-run dynamics of the variables, and the ν coefficient corresponds to the dummy variables. Likewise, α represents the drift constant and ε_t is Gaussian white noise. The ARDL (1,1,1) model was selected based on the information criteria AIC, BIC, and HQC. Also, we ran a structural break analysis using the Gregory-Hansen test for cointegration with regime shifts proposed by Gregory and Hansen (1996) and found a break in 1996. Even though a more reasonable break would have been in 2002, we did not find any breaks the year of the Winter Olympics. However, 1996 could be significant since Utah won the Winter Olympics bid in June 1995, and the state started preparing for the event since then. Therefore, we include a dummy as an exogenous variable with a value of zero before 1996 and one after for the short-term dynamics.

$$lhdiut_t = -0.397 + 0.013^{***} ltaxrev_{t-1} + 0.021^{**} lgdput_{t-1} \quad (7)$$

The results in expression (7) show the significance of tourism income (*ltaxrev*)

as an explanatory variable of human development (*lhdiut*) in the long term. A 1% increase in tourism revenue at *t-1* period would increase human development by 1.3% at period *t*, with a significance of 99%. These results are consistent with what was found in previous estimates on the relationship between tourism income and human development, where the coefficient is positive (Biagi et al., 2017; Croes, 2012; Cardenas-Garcia & Pulido-Fernandez, 2017; Cardenas-Garcia et al., 2015). Even though the coefficient is small, it seems appropriate for Utah, where tourism is not the primary economic sector. We confirm that economic growth is a significant positive variable for human development. A 1% increase in economic growth at the *t-1* period will increase human development by 2.1% in period *t*. The previous empirical evidence of the three variables of interest is scarce. However, these studies found a significant positive relationship, particularly when studying the necessary conditions to achieve human development (Sanchez et al., 2013; Oh, 2005; Cross & Rivera, 2015; Rivera, 2017).

The Bounds Test is carried out on the θ parameters of the modified ARDL regression model to verify the long-term equilibrium relationship, the same as described in equation 4. The results of the limit tests are presented in Table 3.

Table 3 shows that the F statistic (10.89) clearly exceeds the upper limit of the critical value (5.67) at a 95% confidence level tabulated by Kripfganz and Scheneider (2018). The null hypothesis of no long-term relationship between the endogenous variable and the regressors is rejected. It is concluded that the variables of tourism income (*latxrev*) and economic growth (*lgdput*) contain information in the long term that allows predicting human development behavior (*lhdiut*).

Short-Term Dynamics

Since we are interested in the short-term deviations (disequilibria) from the long-term relationship, we estimate the parameters that will help analyze the extension of impacts from a shock due to changes in the dependent variables and duration before returning to the long-term equilibrium. The proposed ECM follows expression (4), which presents one lag of the dependent variable on the right side of the equation as dynamic variables, in addition to the static or contemporary variables:

$$\Delta hdiut_t = \alpha_0 + \alpha_1 ECT_{t-1} + \sum_{i-1}^{p} \beta_1 \Delta hdiut_{t-1} + \sum_{i-1}^{q} \gamma_1 \Delta taxrev_{t-1} + \sum_{i-1}^{q} \gamma_2 \Delta lgdput_{t-1} + \varepsilon_t \quad (8)$$

Again, ECT_{t-1} is the error correction term derived from the long-term cointegration relationship, and its coefficient α_l measures the long-term equilibrium relationship, and the other α_s captures the short-term causal relation. Our proposed model has ARDL (1 1 1) framework with one lag with a restricted constant. Table 4 shows the results

The estimated coefficient of the ECM in Table 4 indicates a high speed of adjustment to equilibrium. The error correction term's coefficient is negative (-0.53), consistent with the model's theoretical requirement of dynamic stability, and at a 95% confidence level. These two characteristics imply that any movement of the equilibrium condition will be decisive in the short-term behavior of the model, and that said imbalance will be adjusted by 53% in each period. As for the explanatory variables, *ltaxrev* is still significant at 99%; however, economic growth is not significant in the short-term dynamics, negatively affecting human development. The inclusion of the dummy variable was correct; it is significant at 99%, which indicates that tourism activities

took off after Utah won the Winter Olimpic bid in June 1995. We need to verify if our specification model is of good fit and it passes all the diagnostic tests.

The diagnostic tests for the model are shown in Table 5. The model residuals do not present signs of heteroskedasticity (Breusch-Pagan and ARCH), non-normality (Jarque-Bera), and serial correlation (Breusch-Godfrey). There are no omitted variables, and the model's specification is correct (RAMSEY).

The stability tests CUSUM and CUSUM2 of the ARDL model are shown in Figures 2 and 3 to evaluate the stability of long- and short-run parameters.

The evolution of the sum (CUSUM) and accumulated sum (CUSUM2) of the normalized residuals does not change systematically, indicating that all values lie within critical boundaries at a 5% significance level. Therefore, the model parameters present some stability in the analyzed period, suggesting that the null hypothesis cannot be rejected (Ho: Parametric Stability).

To confirm the robustness of the cointegration results, we estimate the Fully Modified OLS (FMLOS) appropriate in cases of observed endogeneity between variables.

The results appear in Table 6. As can be seen, the results using the FMOLS corroborate what was obtained in the ARDL estimates. Although very small, the tourism revenue coefficient, ltaxrev, is significant and positive at 90%, while the economic growth variable, *lgdput*, is significant at 99%, with a relatively high coefficient. The dummy variable was also positive and significant. All of the above confirms the validity of the specification proposed in the study.

This section established the long-term equilibrium relationship between a developed region's tourism revenues, economic growth, and human development. These findings go along with the previous empirical evidence; however, this study's central point is to verify if tourism's revenues go beyond economic growth. Thus, it can be considered a tool for boosting human development.

Granger Causality Tests Results

The next step in the analysis is to establish the direction of the causality of the stationary series that share a single cointegration vector. The approach of Engle and Granger (1987) is followed. The causality contrast of Engle and Granger is based on the estimation of a VAR model for two variables, so it is accepted that Y depends on X if the joint nullity hypothesis of the coefficients of the delayed values of X in the equation of Y, and it is assumed that X depends on Y if the rejection of joint nullity refers to the delays of Y in the equation of X. In the case of n delays, the model for the variables proposed in this study would be:

$$ltaxrev_t = \delta_0 + \delta_1 ltaxrev_{t-i} + \cdots + \delta_j ltaxrev_{t-j} + \varphi_1 lhdiut_{t-i} + \cdots + \varphi_j lhdiut_{t-j} + v_{1t} \quad (9)$$

$$lgdput_t = \psi_0 + \psi_1 lgdput_{t-i} + \cdots + \psi_j lgdput_{t-j} + \xi_1 lhdiut_{t-i} + \cdots + \xi_j lhdiut_{t-j} + v_{2t} \quad (10)$$

$$lhdiut_t = \phi_0 + \phi_1 lhdiut_{t-i} + \cdots + \phi_j lhdiut_{t-j} + \eta_1 lgdput_{t-i} + \cdots + \eta_j lgdput_{t-j} + v_{3t} \quad (11)$$

where v_{1t}, v_{2t}, and v_{3t} are white noise errors with zero mean, constant variance,

and no autocorrelation. Causality, in the sense of Granger, goes from $lhdiut_t$ to $ltaxrev_t$ if $\varphi_1 \neq 0$, $\forall_i$ in equation (9). Similarly, for equation (10), the causality in the sense of Granger goes from $lhdiut_t$ to $lgdput_t$, if $\xi_1 \neq 0, \forall_i$. Finally, causality in the sense of Granger goes from $lgdput_t$ to $lhdiut_t$ if $\eta_1 \neq 0, \neq \forall_i$ in equation (11).

The results of Granger's causality are shown in Table 7 and Figure 4. As mentioned before, we argue that Utah's economic development conditions have allowed creating a physical and human infrastructure that has favored tourism to the region. Thus, the working hypothesis follows the EDGT framework, where the causality goes from economic growth to tourism. Furthermore, we expect that the relationship between economic growth and tourism would be reciprocal or bi-directional. Since Utah offers all the enabling conditions for channeling tourism gains to economic growth, we expect this economic growth to enhance human development. Consequently, tourism becomes the catalyst for a virtuous circle of human development.

The first panel of Table 7 shows a one-way causality for the relationship between *ltaxrev* and *lhdiut*, where *ltaxrev* Granger causes *lhdiut* with a statistical F of 6.75. However, the null hypothesis cannot be rejected in the opposite direction, so we conclude that the causality is of one direction, from tourism revenues to human development. The causality direction supports the notion that tourism plays a significant role in human development. Although these effects were expected to be only indirect via economic growth, the Granger test results indicate a direct causality. Even though Croes and Rivera (2015) did not find this relationship for Ecuador's study, our results are consistent with what was proposed by Croes (2012), who argued that tourism could be an instrument to improve the quality of life. The second panel shows another example of one-way causality, from *lgdput* to *lhdiut,* with a statistical F of 3.4. This result is consistent with the hypothesis that economic growth is a condition for economic development (Rivera, 2017; Sanchez et al., 2013). The last panel shows a bidirectional causality that goes from *ltaxrev* to *lgdput* and vice versa with a high significance level. This result is in concordance with the EDTG hypothesis as Utah is a developed region that offers economic conditions where tourism activities could be more attractive to visitors. The previous empirical evidence from the ELTG confirm the reciprocal or bi-directional relationship (Biagi et al., 2017; Rehman et al., 2020; Seghir et al., 2015, Chulaphan & Barahona, 2018)

Figure 4 summarizes the causal relationships between the three variables. As can be seen, the expected virtuous circle from tourism to human development occurs both directly and indirectly. It can be seen how tourism income, *ltaxrev*, has a direct impact on human development, and thus also economic growth. Still, what has been shown is that tourism income also affects economic growth on human development. In the particular case of Utah, it can be concluded that an economic growth policy should consider the objectives of the tourism sector since it will depend on the growth of the region to draw in more internal or external tourism. Similarly, we confirm that economic growth enables human development for the case of Utah, which is essential in terms of growth policy to ensure that the benefits of economic growth translate into a better quality of life for its population.

CONCLUSIONS

After calculating the HDI index for Utah, our results confirm the long-term

relationship between tourism revenues, economic growth, and human development for Utah for the 2000-2018 period. The previous empirical evidence for developed countries indicates that these countries or regions offer favorable conditions for tourism benefits to boost economic growth. Hence, a bidirectional relationship between tourism income and economic growth was also hypothesized. Also, we expected that given Utah's economic development conditions, the economic growth derived from tourism revenues would enhance its population's quality of life conditions. In other words, that the virtuous circle of human development fueled by tourism revenues would be fulfilled. The results of Granger's causality tests tell us something different, with more implications for the role that tourism plays in enhancing the population's quality of life. The causality direction goes from tourism revenues to human development in one direction, confirming this service sector's significance. The EDGT hypothesis is verified for the causality direction between tourism revenues and economic growth. Likewise, it is proven that economic growth can help raise the population's living conditions; therefore, an inclusive economic growth policy will transform the benefits of growth into improvements in the quality of life of Utah's population.

The results of our study have even more implications after the hit of COVID-19. Even though this article does not cover data from 2020, it demonstrates how infrastructure conditions (physical and human capital) influence the arrival of visitors. We believe that our results wouldn't change if we included data from 2020, as we think the trend will resume after a drop in 2020. However, state policies that ensure the safety of its visitors are even more important today to keep a dynamic leisure and hospitality sector. Utah has the advantage that it is a destination for outdoor activities, which does not require enforcing vaccine or mask mandates. However, it is essential to have a healthy job force in the industry, then policies that encourage vaccinations and testing can reduce the chances of disruptions. Furthermore, Utah must benefit from federal spending aid to renovate its physical infrastructure in areas with tourist potential. Cooperation programs with communities in rural areas to create favorable conditions for tourism arrival are essential. The physical infrastructure must be accompanied by support for education and health so that tourism can exert its transforming force from economic growth to human development.

In closing, this study supports the notion that tourism should receive more attention from policymakers to redefine the role of tourism beyond economic growth since the effects of tourism revenues go directly to improve human development for the region.

Regarding the limitations of this work, it would be necessary to extend the analysis to the Utah counties using panel data to examine the differences between urban and rural areas. As mentioned in previous sections, some rural areas depend heavily on tourism, so we expect some differences in the results when differentiating between urban and rural areas. Similarly, it is necessary to compare the results with the adjusted HDI indices, where differences in income inequality are present. Also, extending the data to 2020 would help identify the regions where Utah tourism suffers the most in terms of economic growth and human development.

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TABLE 1. PUSH AND BREAK FACTORS

Groups	Push	Break
Infrastructure	Access to the coast	Number of homicides
	Paved roads	Conflict-related deaths
	Armed forces personnel	
	Telephone lines	
	Internet subscribers	
	Electricity production	
	Hospital beds	
Population Characteristics	Pop. < 14 years	Emigration with a tertiary education
	Working population	Unemployment
		Pop. > 65 years
Foreign exchange	Net-trade in goods & services	External leaks direct investment
	Exports of goods & services	External leaks workers remittances
	Tax revenue	Internal leaks
Investment climate	GDP per person employed	Dismissal costs
	Strength of legal rights	
Environmental dimension of sustainability	Energy without CO2 emissions	CO2 emissions
	Renewable freshwater resources	Production of electricity
	Cultivated land	Electric power consumption

Source: based on Cardenas-Garcia and Pulido-Fernandez (2017)

TABLE 2. UNIT ROOT ANALYSIS

Variable	With Trend		No Trend	
	Levels	Differences	Levels	Differences
lhdiut				
ADF	-1.763	-3.460*	-2.39	-3.368**
PPerron	-1.595	-6.555***	-1.087	-6.904***
ZAndrews	-5.408***	-7.397***	-4.586*	-7.752***
lhdiut				
ADF	-1.763	-3.460*	-2.39	-3.368**
PPerron	-1.595	-6.555***	-1.087	-6.904***
ZAndrews	-5.408***	-7.397***	-4.586*	-7.752***
lgdput				
ADF	2.116	-3.553*	1.098	-3.018**
PPerron	-1.893	-2.941	-0.303	-3.005**
ZAndrews	-4.898**	-4.721**	-4.478	-5.526***

Source: authors' calculations.
Notes: *, ** and *** denote statistical significance at the 10%. 5% and 1% level

TABLE 3. KRIPFGANZ AND SCHENEIDER CRITICAL VALUES

Statistic I(0)		10%		5%		1%	
		I(1)	I(0)	I(1)	I(0)	I(1)	
F	10.888	3.431	4.602	4.301	5.666	6.473	8.303

Source: authors' calculations

TABLE 4. ARDL ECM

Dependent Variable	*d.lhdiut*	*t*	*p*
ECT_{t-1}	-0.528	-4.49	0.000
$d.ltaxrev_t$	0.013	3.87	0.001
$d.lgdput_t$	-0.054	-1.40	0.175
dum	0.016	3.93	0.001
R^2a	0.65		
Obs.	28		

Source: authors' calculations.

TABLE 5. DIAGNOSTIC TESTS ON THE ARDL-ECM

Hypothesis	Test	Statistic	Probability
Heteroskedasticity	Breusch-Pagan	0.33	0.567
	ARCH	0.134	0.715
Normality	Jarque-Bera	0.875	0.646
Serial Correlation LM test	Breusch-Godfrey	0.672	0.412
Specification	RAMSEY	1.58	0.229

Source: authors' calculations.

TABLE 6. FULLY MODIFIED OLS (FMOLS)

Dependent Variable	*lhdiut*	*z*	*p*
ltaxrev	0.005	1.96	0.05
lgdput	0.334	5.77	0.00
dum	0.024	6.15	0.00
constant	-0.507	-8.23	0.00

Source: authors' calculations.

TABLE 7. GRANGER CAUSALITY TESTS

Pair	Null Hypothesis	F-statistic/(p-value)	Direction of causality
1	*ltaxrev* does not Granger cause *lhdiut*	6.751 (0.009)	Unidirectional from *ltaxrev* to *lhdiut*
	lhdiut does not Granger cause *ltaxrev*	0.243 (0.876)	
2	*lgdput* does not Granger cause *lhdiut*	3.391 (0.048)	Unidirectional from *lgdput* to *lhdiut*
	lhdiut does not Granger cause *lgdput*	0.445 (0.505)	
3	*ltaxrev* does not Granger cause *lgdput*	6.751 (0.009)	Bidirectional
	lgdput does not Granger cause *ltaxrev*	0.243 (0.876)	

Source: authors' calculations.

FIGURE 1. HUMAN DEVELOPMENT INDEX UTAH

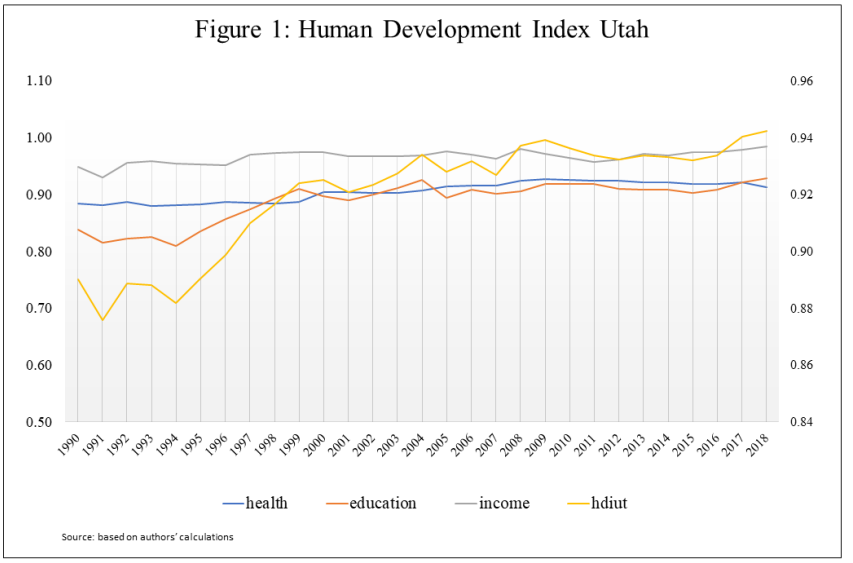


FIGURE 2. PLOT OF CUMULATIVE SUM OF RECURSIVE RESIDUALS

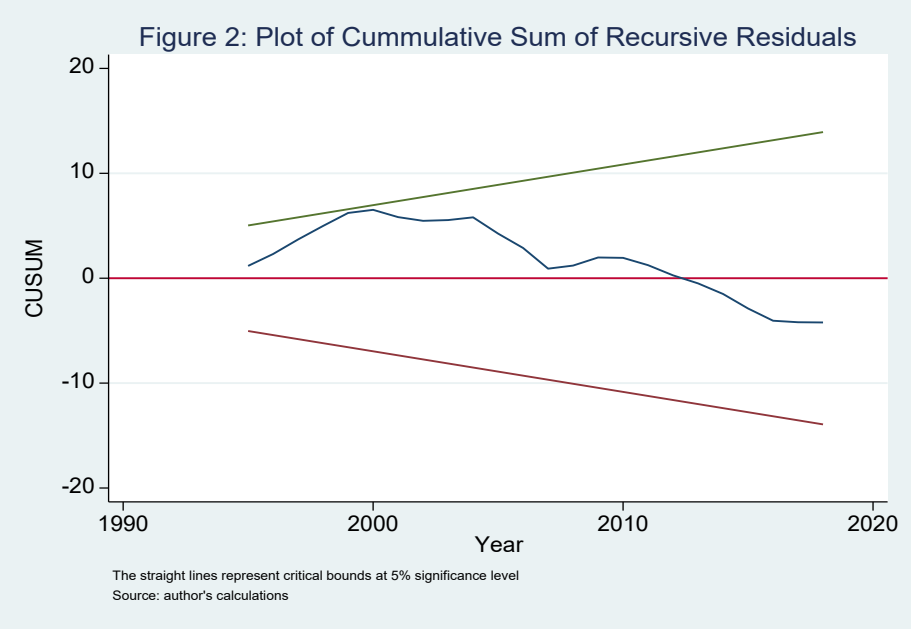


FIGURE 3. PLOT OF CUMMULATIVE SUM OF SQUARES OF RECURSIVE RESIDUALS

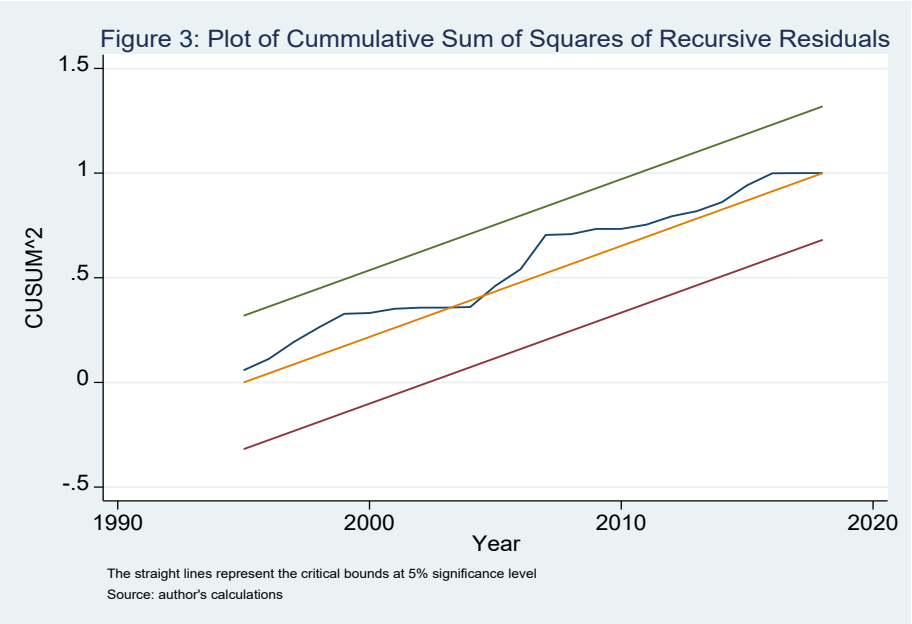
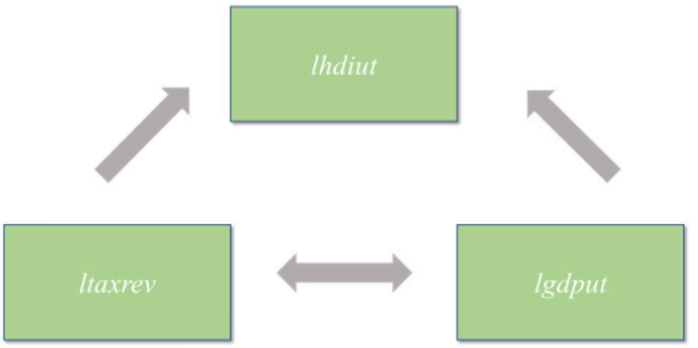


FIGURE 4. CAUSALITY LINKS



Source: Based on Table 6.