



## RESEARCH ARTICLE

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# Measuring the size of the informal tourism economy in Thailand

Erdinç Çakmak<sup>1</sup> | M. Alper Çenesiz<sup>2</sup><sup>1</sup>Breda University of Applied Sciences, Breda, The Netherlands<sup>2</sup>Nottingham Business School, Nottingham Trent University, United Kingdom**Correspondence**Erdinç Çakmak, Breda University of Applied Sciences, Breda, The Netherlands.  
Email: cakmak.e@buas.nl**Abstract**

This study is the first to estimate the size of the informal tourism economy. Using a dynamic general equilibrium model, this paper first estimates the size of the informal tourism economy and then assesses its linkages to key labour market variables in Thailand. Empirical results indicate that: (a) the informal tourism economy grows faster than the formal tourism and aggregate economy; (b) both formal and informal tourism economies absorb the unemployed; (c) the relationship between formal and informal economies is negative in the aggregate but positive in the tourism sector.

**KEYWORDS**

gender gap, informal economy, informal tourism economy, labour market, shadow economy, size, Thailand, trends, vulnerable employment

## 1 | INTRODUCTION

Worldwide, more than 2 billion people earn their livelihoods in the informal economy and 47% of those working in the service sector have informal employment (International Labour Organization [ILO], 2018). Despite the debates and critiques about the informal economy, several studies continued to attest the role of informal entrepreneurs in the tourism and travel sector. Although they do not register their activities officially to avoid taxes and regulation (Webb, Bruton, Tihanyi, & Ireland, 2013), the informal tourism entrepreneurs create jobs (Webb, Tihanyi, Ireland, & Sirmon, 2009), support and teach skills to one another (Damayanti, Scott, & Ruhanen, 2017) and fill the product and service gaps in the formal tourism sector (Çakmak, Lie, & Selwyn, 2019). This renewed interest in the informal tourism economy stems from the fact that it can provide deeper and detailed information necessary—for instance—in designing effective policies, depicting national employment trends, monitoring informal conditions and analysing linkages between entrepreneurship and economic growth. Yet little is known about the contribution of the informal tourism economy to the national economy in aggregate and until today there has been no study which estimated its size (Kedir, Williams, & Altinay, 2018).

The goal of this article is to estimate the size of the informal tourism economy and to reveal the dynamic interplay between the informal tourism economy and the labour market in Thailand. To this end,

this paper seeks answers to two interrelated questions. First, what is the relationship between the informal tourism economy and the national economy in aggregate and how do they behave during the economic and political up and down-turns? Second, how do developments in the size of the informal tourism economy relate to (*un*) *employment, labour force participation (LFP), self-employed in the service sector and gender?*

This paper contributes to the tourism literature because it is the first to estimate the size of the informal tourism economy and empirically study the informal and formal tourism economies' influence on several features of the labour market rather than only focussing on the impacts of formal sectors. The informal economy is a permanent and basic component of the total economy, and without knowing the size of the informal tourism economy, it is not possible to calculate the total contribution of the tourism sector to the national economy. This study's practical importance lies in providing tourism professionals and policymakers with information about the labour mobility and gender gap issues in the labour market. Such information will enable them to reconsider models and national policies and regulations on tourism entrepreneurship and employment. Because the formal and informal tourism economies are dynamically linked to each other and many enterprises from both sides have production and distribution relations (e.g., sub-contracting arrangements), they influence the labour mobility and can alter the gender gap in the labour market.

In estimating the size of the informal economy, this paper employs a deterministic two-sector (formal and informal) dynamic general equilibrium model that is applied to Thailand. As the second largest economy in Southeast Asia, Thailand hosts more than 3 million international migrants and nearly half of these are undocumented and work as informal workers and entrepreneurs throughout the country (Chanwanpen, 2018). In addition, tourism is a fast-growing sector and a key to the Thai national economy in creating jobs, decreasing unemployment and providing foreign exchange (Hawkins & Mann, 2007; Pongajam, 2017). Though, this study focuses on Thailand, inevitably the method used can also be easily applied to other countries to estimate the size of their informal tourism economy and its role in the labour markets. The paper is structured as follows: first the informal economy in the developing world with relation to the informal tourism economy and labour is reviewed. Next, a contextual study is conducted about the tourism development and dynamics in Thailand. After that, the informal economy theory, and the estimation methods of the size of informal economy are reviewed. Based on this review, a justification of the preferred method is determined. Finally, based on the findings from the empirical study, theoretical and practical implications about the size of the informal tourism economy and how it relates to the general economy are provided.

## 2 | LITERATURE REVIEW

### 2.1 | Informal economy in the developing world

There is a plethora of terms used to describe the informal economy such as “moonlighting” or the “undeclared,” “black,” “shadow,” “off-the-books,” “hidden,” economy (Williams, 2005). The informal economy includes legal market activities conducted by firms, workers and enterprises, which are not registered or kept hidden from the public authorities for tax, social security and labour law purposes (European Commission, 2007; ILO, 2002; The Organisation for Economic Co-operation and Development [OECD], 2012; Williams, 2017). As defined by the ILO (2002), the informal economy does not include any criminal activities such as the production and distribution of illegal goods and services which are prohibited by law. The informal economy actors produce and distribute legal goods and services, though their production and employment arrangements are unregistered and may not be strictly legal. In addition, this definition of the informal economy also does not include the reproductive or care economy which includes the production of goods and services within the household for self-consumption (ILO, 2002). Although it recognizes the existence of classical illegal and criminal activities in the informal tourism economy in Thailand, this study does not include any informal crime activities and illegitimate operations (e.g., illegal wild life trade, human trafficking, tourist harassment by vendors, drug dealing and so on) which are “antisocial in intent” (De Soto, 2002, p. 11), and considers only legitimate activities, which fall within informal institutional boundaries as informal economic phenomena.

Informality is an essential phenomenon in the daily lives of people, particularly in the global South, and has received considerable attention from scholars in the last four decades (Perkins, Radelet, Block, & Lindauer, 2012). A voluminous literature from different disciplines exists on the economic, sociological, institutional and ethnographic aspects of the informal economy (De Soto, 2002; Djankov, Glaeser, La Porta, Lopez-de-Silanes, & Shleifer, 2003; Williams, 2008) with a recent few studies in management, which explore the dynamics in the informal economy (Godfrey, 2011). Yet, relatively little knowledge exists about the processes underlying value creation and economic dynamism in the informal economic sectors (Estrin & Mickiewicz, 2012). The reason for the broad interest of policymakers and researchers in the informal economy is its enormous capacity to absorb unemployment and provide jobs: more than 60% of the global workforce aged 15 and over is employed in the informal economy (ILO, 2018). Contrary to the modernization theory, which views the informal economy as a historical legacy expected to rapidly disappear with the advent of the modern formal economy (Geertz, 1963; Gilbert, 1998), there is ample evidence of the reality of the informal economy that is a fundamental component of the developing economies. Examining only the formal economy, therefore, provides only a very partial representation of the nature of economies and labour markets (Williams & Horodnic, 2018).

Given the importance of the informal economy, there is considerable difference in its share in countries' gross domestic products (GDPs) across regions. For instance, the weighted average size of the informal economy in official GDPs reaches 13.4% in high-income OECD countries, and is much higher in Central Asia at 36.4%, and in Sub-Saharan Africa at 37.6% (Schneider & Enste, 2013). Some scholars see the informal economy in negative terms due to its adverse effects on public finances such as decreasing tax revenues and the provision of public services (De Paula & Scheinkman, 2007; Levy, 2010). Some others see it in positive terms as the informal economy boosts entrepreneurial talents, provides income for the poor and promotes flexible labour market initiatives during economic downturns (Biggs, Hall, & Stoeckl, 2012; Jones, Mondar, & Edwards, 2006).

In terms of distribution by sectors, the agriculture sector represents almost half of the informal economy in most parts of the world, while manufacturing, construction and the service sectors account for the other half. The service sector represents around 47% of the informal economy in Asia (ILO, 2018). Although South East Asia has experienced robust economic growth in the past decade, the share of informal economic activity in GDPs has remained persistently high (Ahlstrom & Ding, 2014). One of the key drivers why informal enterprises have dominated Asia is the poverty of owners (Young, Ahlstrom, Bruton, & Rubanik, 2011). Socially disadvantaged groups such as women, migrants and ethnic minorities have difficulties accessing capital to establish reasonable livelihoods. The entrepreneurship among these groups is not always a choice but a necessity due to their lack of capital and their disadvantaged position in the labour market (Çakmak, Lie, & McCabe, 2018). In Asia and the Pacific region, informal entrepreneurship is particularly important for poverty alleviation because nearly 1.3 billion people live in extreme poverty

(defined as a daily income of less than US\$1.25) in these areas (Wan & Sebastian, 2011).

Despite the vast quantity of research examining the size of the informal economy in aggregate over the last decade, our understanding of country level dynamics is still deficient, mainly because of the dearth of datasets tracking informal economic activities across countries. Another important challenge in measuring the size of the informal economy is the harmonization of concepts at international level. This makes it difficult to make systematic and comprehensive comparisons about the development of informal economic sectors across countries.

## 2.2 | The informal tourism economy and labour

The informal tourism economy includes all the market activities of agents and businesses engaging with the tourism industry directly or indirectly, but often these activities are not registered with the authorities, formal associations or trade organizations (Slocum, Backman, & Robinson, 2011). In most cases, the agents of the informal tourism economy consist of street vendors, unofficial tour guides, individual transport providers, handicraft producers, artisans, providers of homestays, holders of food stalls, musicians and dance troupes. Their activities are generally beyond the effective control of authorities (Crick, 1992) but the local community benefits from the income from these activities, especially during an economic crisis (Brata, 2010; Cukier, 2002; Dahles & Prabawa, 2013).

Oppermann (1993) distinguishes the informal tourism economy from its formal counter one through its high integration into the local economic structure that leads to a low leakage and therefore a resulting higher multiplier effect on the local economy. Yet, the informal tourism commerce relies more on the formal tourism businesses' customers and increases the latter's offers by boosting novelty and vibrancy (Henderson & Smith, 2009). Arguably, tensions exist and the formal economy is considered the dominant party that is protected and supported by the government's tourism policies, while the informal economy is subject to rules and regulations in order to assure the effective functioning of formal businesses (Meyer, 2006; Wahnschaft, 1982).

It is evident that tourism represents an important sector for many developing countries in their search to reduce poverty, and that it has a strong positive correlation with economic growth (Antonakakis, Dragouni, & Filis, 2015; Tang & Tan, 2015). Sinclair (1998) suggested that an increase in the tourism revenues has significant impact on the developing countries' economies. This, however, does not mean that every tourism destination can experience positive economic impacts (e.g., fewer leakages and higher tourism competitiveness) unless its government moves towards a more democratic regime (Antonakakis et al., 2015). In addition, formalizing the informal enterprises is not a straightforward intervention for the developing countries' governments. For instance, Slocum et al. (2011) argued that the contemporary policy agendas to formalize the informal economy negate the economic benefits of tourism development, which were intended to

bring growth and prosperity to Tanzania. The policies which primarily aimed to formalize the informal economic activities have increased the main bureaucratic barriers such as licensing procedures, corruption, a complicated tax system and harassment of small entrepreneurs in Tanzania. Consequently, the productivity level in production capabilities have decreased in the Tanzanian tourism sector and the general unemployment rate increased throughout the country.

Recent research in tourism studies concerning the informal economy focuses on the new issues and approaches such as the resilience of informal tourism enterprises to natural disasters (Biggs et al., 2012), street vendors' contribution to tourism development (Yotsumoto, 2013), tourism financing systems and networks (Ngoasong & Kimbu, 2016), coopetition among the informal tourism service providers (Damayanti et al., 2017), informal women entrepreneurs' role in ethnic tourism (Trupp & Sunanta, 2017), street vendors' perspectives on tourism and poverty alleviation (Truong, 2018), informal business tourism (Rogerson, 2018) and the tales of informal tourism enterprises (Pécot, Gavilanes, & De Viteri, 2018). Given the importance of entrepreneurship for the welfare of a local community in general and for tourism stakeholders in the informal tourism economy in particular, two very recent articles (Çakmak et al., 2018, 2019) examine the informal tourism entrepreneurs' capital possession and how the tourism stakeholders use these forms of capital in determining their position in the tourism field and beyond. Thus far, still, there has been little systematic research into how the informal tourism economy grows and links to the national economy in aggregate and to the labour market.

## 2.3 | The Thai tourism sector and dynamics of informality

Thailand is one of the top 10 tourist destinations in the world rankings and it is the second largest economy in Southeast Asia, yet with the highest ratio of revenue arising out of the informal economic sector (Tourism Authority of Thailand, 2018). In the last two decades, the tourism sector in Thailand has experienced a five-fold increase in international tourist arrivals from 7 million in 1997 to 35 million in 2017. A recent study argues that the fast growth in tourism will continue and the number of international visitors will record 79 million by 2030. This would make Thailand the fifth biggest tourist destination in the world (Euromonitor International, 2018).

Thailand's geographical position and its relatively developed infrastructure—in comparison to its neighbours—make it an important tourism hub in mainland Southeast Asia.

The governance of tourism is very important for the policy makers in Thailand, since tourism accounts for about 6% of the national GDP and is a significant foreign exchange earner. Despite several regional and global crises (e.g., 1997 Asian economic crisis, 9/11 attacks in 2001, the outbreak of contagious diseases in 2003, the Indian ocean earthquake and tsunami in 2004 and several riots and political uncertainty including coups), the Thai tourism industry has shown high resilience and recovered much faster from crises than

its neighbouring countries (Beirman, 2016). The Thai tourism sector is also an important job provider and generated 6 million jobs in 2018 and was responsible for 15.9% of all employment nationwide (World Travel and Tourism Council [WTTC], 2019). Both directly related businesses (e.g., hotels, airlines, tour operators, airports) and indirectly related businesses (e.g., restaurants, souvenir shops and laundries, which supply products and services to the travel and tourism industry) generate jobs in the informal and formal tourism markets.

The informal economy in Thailand encompasses not only the tourism sector but also many other sectors like agriculture, construction, manufacturing, transportation, retail and services. The relatively rapid economic growth in Thailand—visibly in its tourism sector—has attracted labour migrants from rural areas and from neighbour countries to major Thai cities to work in these informal sectors (De Jong, 2000). These labour and entrepreneur migrants benefit Thailand not only in terms of generating new skills, decreasing the formal sectors' transaction costs and by doing so helping them to sustain their competitiveness; they also benefit their own communities of origin by transferring remittances to their families to spend on basic living costs, health care and education. Remittances refer to inflows of migrants' income (in cash and kind) back to the migrants' countries and regions of origin (Adams, 2011; Mora-Rivera, Cerón-Monroy, & García-Mora, 2019). In 2018, it is estimated that the total amount of remittances from Thailand to abroad was US \$4.8 billion, with 32% of this being sent to the neighbouring countries (Bank of Thailand, 2019). Earlier studies reported that the lion's share of remittances was sent by the migrants to the neighbouring countries (e.g., Myanmar, Cambodia and Laos) mainly through informal channels (Daelen & Vasuprasat, 2010).

As a result, the number of informal entrepreneurs and workers at tourism destinations is consistently increasing with the growth of tourism in Thailand. This growth has prompted national and local authorities to formulate several policies to control the processes and activities of informal tourism actors. For instance, street vending is not legal in Thailand unless permission is granted by authorized local officers (Tangworamongkon, 2014). In many cases, street vendors claim that they do not receive any formal receipt for the payment of their vending related fees, or they pay a monthly bribe to local inspectors to operate outside of the designated areas (Tangworamongkon, 2014).

## 2.4 | The informal economy theory and measuring its size

Researchers have used three prominent methods to estimate the size of the informal economy: namely, direct, indirect and latent-variables approaches (Schneider & Enste, 2000). The direct approach basically attempts to quantify the number of production entities in the informal economy and uses surveys and tax auditing samples in micro econometric estimations of the size of the informal economy (Isachsen & Strøm, 1985; Pedersen, 2003). The in-detail use of information on the informal economy is an advantage. The direct approach method, however, is costly due to conducting surveys on a frequent basis to achieve

a consistent longer period time series. In addition, this method is associated with endogeneity problems due to measurement errors, selection bias and simultaneity (e.g., as respondents may lie about their formal/informal status) and it does not render a dynamic analysis possible.

The indirect approach uses macroeconomic indicators—supposed to contain information about the informal economy—such as the gap between national expenditure and income, the gap between the official and actual labour force, the demand for electricity and the demand for currency (Schneider & Enste, 2013). It is expected that expenditure and income need to be the same in national accounts. A possible gap existing between expenditure and income reveals a measure of the informal economy. Similarly, a possible gap between official and actual labour force shows the size of the unregistered labour force working in the informal sectors. Another indirect method (the electricity approach) considers only one indicator – the elasticity between GDP and demand for electricity—and assumes it will capture all the effects of the informal economy (Schneider, Buehn, & Montenegro, 2010). Finally, similarly to the supposition that all the informal economy transactions are conducted in cash, it is assumed that an increase in the size of the informal economy will lead to an increase in the demand for currency.

The fundamental criticism of the direct and indirect approaches is the assumption, implicit in both methods, that the determinants of the informal economy are unique. To overcome this critique, the latent-variables approach assumes that there are multiple-indicators and multiple-causes, and hence the name MIMIC model. The MIMIC model uses a structural econometric model to establish the causes and the effects of the informal economy. This approach, however, lacks a theoretical basis for the inclusion of the indicators as causes and robustness in terms of data transformations, to the units of measurement and to the sample used. To rectify these weaknesses, Solomon (2011) uses a dynamic general equilibrium model as a theoretical basis, identifying the causes and indicators in estimating the size of the informal economy. The method of Orsi, Raggi, and Turino (2014) and Solis-Garcia and Xie (2018) is similar in this vein. In estimating the size of the informal GDP in Thailand, this study follows the approach of Orsi et al. (2014) and Solis-Garcia and Xie (2018). Although this study uses a similar estimation method, yet, neither Orsi et al. (2014) nor Solis-Garcia and Xie (2018) provide an estimation of the size of informal economy in Thailand. For comparison purposes, this study also adds the widely used Schneider et al. (2010) estimate for Thailand and assesses the model's performance.

## 3 | METHODS

### 3.1 | Model

The model in this study builds on Ihrig and Moe's (2004) one, and, thus, its description is rather brief. The economy consists of a representative yeoman (consumer-producer) and a government. The government taxes formal production at a rate of  $\tau_t$  and uses its tax revenue to finance its spending,  $g_t$ . Government spending is of no use

to the yeoman. The production technology in the formal sector is given by  $y_{f,t} = a_{f,t} k_t^\alpha l_{f,t}^{1-\alpha}$ , where  $y_{f,t}$  is the formal GDP,  $a_{f,t}$  is total factor productivity in the formal sector,  $k_t$  is the stock of capital,  $l_{f,t}$  is hours-worked in the formal sector, and  $\alpha$  is the share of capital in the formal GDP. As in Orsi et al. (2014), Solis-Garcia and Xie (2018), the government runs a budget in each period.<sup>1</sup> The assumption of a balanced government budget follows much of the macroeconomics literature and greatly simplifies the analysis. Note that the taxes in the current model are distortionary. One could simply include the government debt in the model but doing that would greatly shift the focus of the paper to the effects of deficit financing and distortionary taxation. Though such an analysis is quite interesting, it also is out of the scope of this paper and, thus, left for future research, namely,

$$\tau_t = \frac{g_t}{y_{f,t}}, \tag{1}$$

The production technology in the informal sector is given by  $y_{i,t} = a_{i,t} l_{i,t}^\gamma$ , where  $y_{i,t}$  is the informal output,  $a_{i,t}$  is total factor productivity in the informal sector,  $l_{i,t}$  is the hours worked in the informal sector and  $\gamma$  measures returns to scale.<sup>2</sup> In assuming that the production technology in the informal sector abstracts from informal capital, the paper stays closer to the literature (Ihrig & Moe, 2004; Solis-Garcia & Xie, 2018). Moreover, taking into account that the capital data (even for industrialized countries) are very noisy, this assumption simplifies the analysis enormously. Ihrig & Moe justify this assumption by pointing out the lack of access of agents in the informal sector to formal capital markets and the fact that production methods in the informal sector are much more labour intensive than in the formal sector. They further cite the work De Soto (1989) documenting that “...monthly interest rates (outside of the formal credit market) for informal businesses are close to 22% in Lima during June 1985. At the same time, a formal business could obtain a maximum rate of 4.9% at a bank.”

The yeoman chooses consumption,  $c_t$ , the stock of capital to be employed in the next period,  $k_{t+1}$ , hours-worked in the formal sector,  $l_{f,t}$  and in the informal sector,  $l_{i,t}$  to maximize her utility

$$\sum_{t=0}^{\infty} \beta^t \log c_t$$

subject to

$$c_t + k_{t+1} \leq (1 - \tau_t) a_{f,t} k_t^\alpha l_{f,t}^{1-\alpha} + (1 - \rho_t) a_{i,t} l_{i,t}^\gamma + (1 - \delta) k_t, \tag{2}$$

$$l_{f,t} + l_{i,t} \leq T, \tag{3}$$

where  $\beta$  is the discount factor,  $\delta$  is the depreciation rate of capital stock,  $T$  is the total time devoted to work, and  $\rho_t$  is the probability of being caught by the tax authority. The term  $\rho_t$  can also be thought as the indirect taxes to be paid by informal actors if they are caught by the authorities. The first order conditions with respect to  $l_{f,t}$  and  $l_{i,t}$  can be arranged to obtain

$$(1 - \tau_t)(1 - \alpha) a_{f,t} k_t^\alpha l_{f,t}^{1-\alpha} = (1 - \rho_t) \gamma a_{i,t} l_{i,t}^{\gamma-1}. \tag{4}$$

Equation (4) implies that in equilibrium, the marginal product of formal labour equals that of informal labour. It is straightforward to show that the steady state size of the informal sector increases when the tax rate in the formal sector ( $\tau$ ) rises or when the enforcement in the informal sector ( $\rho$ ) decreases (Ihrig & Moe, 2004).

### 3.2 | Data

The data used to estimate the size of informal GDP in Thailand are annual, cover the period 1950–2017 and are retrieved from the Penn World Table (PWT) version 9. PWT is a source of data on real GDP and its components, covering 182 countries for more than 60 years (Feenstra, Inklaar, & Timmer, 2015). This database uses detailed prices—of both traded and non-traded goods and services—collected across countries by the International Comparison Program of the World Bank. The combined price level from these detailed prices results in an overall price level that represents the purchasing power parity of each country much more effectively than, for example, a purchasing power parity that is constructed only by exchange rates. Thus, international comparisons based on PWT data are rather reliable. Furthermore, the time covered by the data is larger than the existing alternatives (e.g., World Development Indicators [WDI] compiled by the World Bank). Nevertheless, the current analysis also makes use of the WDI database, providing a rich set of time series indicators for 217 economies. Tables 1 and 2 list, respectively, details of the PWT and WDI data used.

### 3.3 | Measurement of the size of informal GDP and tourism output in Thailand

In the first step, a value of the left-hand side (LHS) of Equation (4) is obtained for each year. For taxes,  $\tau_t$ , as Equation (1) dictates, the data

**TABLE 1** PWT Data: variables, acronyms, range

Variable	Acronym	Database	Range
Average hours worked	Avh	PWT	1950–2017
Capital	Rkna	PWT	1950–2017
Consumption	Rconna	PWT	1950–2017
Depreciation rate	Delta	PWT	1999
Employment	Emp	PWT	1950–2017
Labour share	Labsh	PWT	1950–2017
Share of government consumption	chs_g	PWT	1950–2017
Total factor productivity	Rtftpna	PWT	1950–2017

Note: Only the 1999 value of the depreciation rate is needed in the estimation.

Abbreviation: PWT, Penn World Table.

**TABLE 2** WDI Data: variables, acronyms, range

Variable	Acronym	Database	Range
Employment in services, female (% of female employment)	SL.SRV.EMPL.Fe.ZS	WDI	1971–2017
Employment in services, male (% of male employment)	SL.SRV.EMPL.MA.ZS	WDI	1971–2017
Employment in services (% of total employment)	SL.SRV.EMPL.ZS	WDI	1971–2017
GDP	NY.GDP.MKTP.CD	WDI	1975–2017
Labour force participation rate, female (% of female population ages 15+)	SL.TLF.CACT.FE.NE.ZS	WDI	1978–2017
Labour force participation rate, male (% of male population ages 15+)	SL.TLF.CACT.MA.NE.ZS	WDI	1978–2017
Labour force participation rate, total (% of total population ages 15+)	SL.TLF.CACT.NE.ZS	WDI	1978–2017
Ratio of female to male labour Force participation rate	SL.TLF.TOTL.Fe.ZS	WDI	1978–2017
Service exports	BX.GSR.NFSV.CD	WDI	1975–2017
Travel services (% of service exports)	BX.GSR.TRVL.ZS	WDI	1975–2017
Unemployment, female (% of female labour force)	SL.UEM.TOTL.FE.NE.ZS	WDI	1975–2017
Unemployment, male (% of female labour force)	SL.UEM.TOTL.MA.NE.ZS	WDI	1975–2017
Unemployment, total (% of total labour force)	SL.UEM.TOTL.NE.ZS	WDI	1975–2017
Unemployment, youth female (% of female labour force ages 15–24)	SL.UEM.1524.FE.NE.ZS	WDI	1976–2017
Unemployment, youth male (% of male labour force ages 15–24)	SL.UEM.1524.MA.NE.ZS	WDI	1976–2017
Unemployment, youth total (% of total labour force ages 15–24)	SL.UEM.1524.NE.ZS	WDI	1976–2017
Vulnerable employment, female (% of female employment)	SL.EMP.VULN.Fe.ZS	WDI	1987–2017
Vulnerable employment, female (% of female employment)	SL.EMP.VULN.MA.ZS	WDI	1987–2017
Vulnerable employment, female (% of total employment)	SL.EMP.VULN.ZS	WDI	1987–2017
Wage and salaried workers, male (% of male employment)	SL.EMP.Work.Fe.ZS	WDI	1987–2017
Wage and salaried workers, male (% of male employment)	SL.EMP.WORK.MA.ZS	WDI	1987–2017
Wage and salaried workers, total (% of total employment)	SL.EMP.Work.ZS	WDI	1987–2017

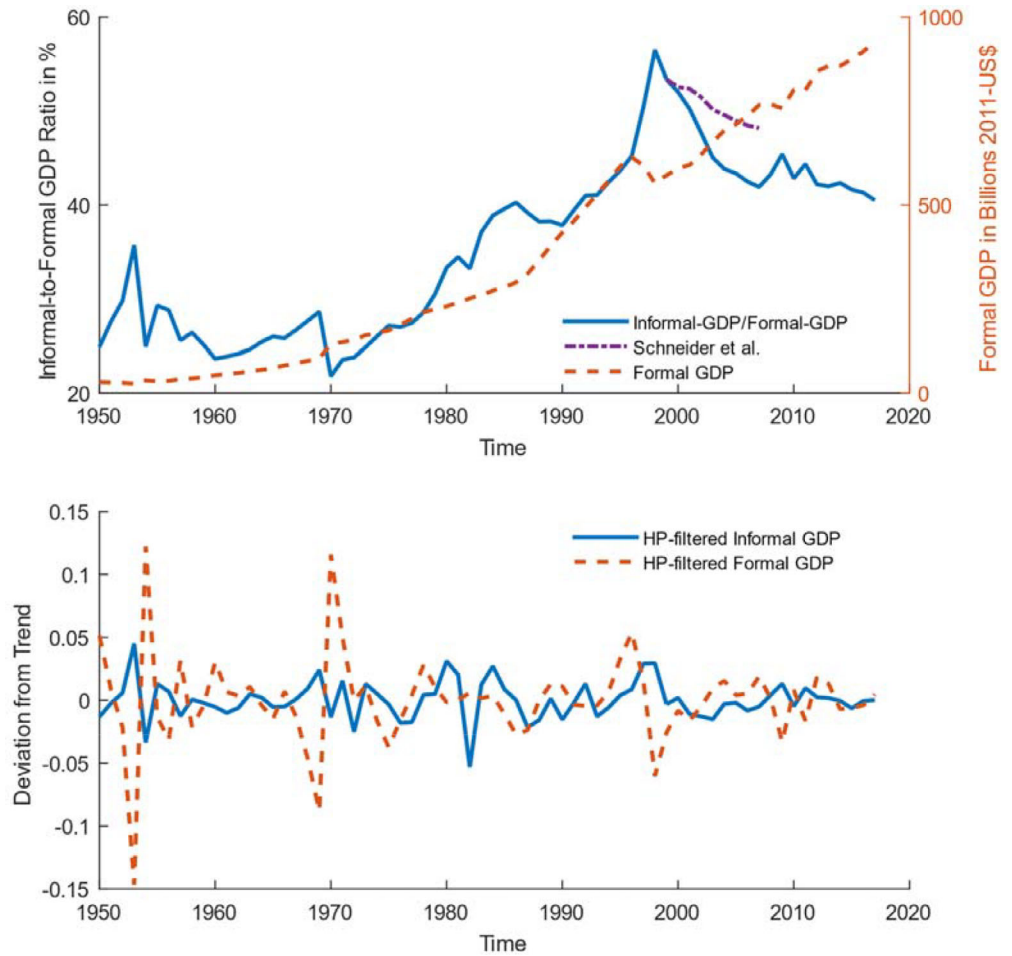
Note: GDP data from WDI is only used to get the ratio *service-exports/GDP*.  
Abbreviation: WDI, World Development Indicators.

for the share of government consumption,  $g_t/y_{f,t}$ , are used. For labour share,  $(1 - \alpha)$ , the average of labour share in our data, which is 0.43, is used. For total factor productivity,  $a_{f,t}$ , and capital stock,  $k_t$ , the ones reported as constant 2011 national prices in our data are used. Formal labour,  $l_{f,t}$  is specified as the product of the number of people employed and the average annual hours worked.

Now a time series of the LHS of Equation (4) is obtained. It will be used to generate a time series of informal labour,  $l_{i,t}$ . On the right-hand side (RHS) of Equation (4), however, there are three other unknowns in addition to informal labour. Hence, three further assumptions are in order. First, the relative size of the informal

economy in year 1999 (as a base year) in Thailand is assumed to be the same as that reported in Schneider et al. (2010, p.30), that is  $y_{i,1999}/y_{f,1999}$  is set to 53.4%. Second, following Ihrig and Moe (2004) and Solis-Garcia and Xie (2018), the enforcement parameter,  $\rho_t$ , is assumed to be zero in all years. Third, the growth rate of total factor productivity in the informal sector is assumed to be the same as that of capital stock. The first two of these assumptions are subjected to a number of sensitivity analyses in Section 5. The last one relies on the desire to have a smooth growth rate of total factor productivity in the informal sector. It is a desired property so that the estimated series rely less on the swings derived by exogenous shocks. It turns

**FIGURE 1** Informal versus formal GDP. Note: The solid line represents the size of the informal GDP (relative to the formal GDP and measured by left axis and in % in the upper panel) while the dashed line represents the formal GDP (measured by the right axis and in billions 2011US\$ and at constant 2011 national prices in the upper panel) [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



out that formal capital follows the smoothest path among the key macro variables in the PWT (e.g., the standard deviation of formal capital is a quarter of the standard deviation of the formal output and a tenth of that of formal investment). Hence, this assumption allows for a more accurate representation of the estimated informal GDP derived from the cost-benefit relation presented in Equation (4).<sup>3</sup> Instead, one could follow Solis-Garcia and Xie (2018) and assume the existence of a *balanced growth* path, defined by the Kaldor facts (Kaldor, 1963). Kaldor facts suggest that the capital-output ratio, the interest rate and the distribution of income between capital and labour are roughly constant. The current analysis, however, cannot assume balanced growth because the Thai economy does not feature these stylized facts. In addition, note that in the last 30 years, even the US economy, from which the Kaldor facts were derived, has overturned the last two of the stated facts (Eggertsson, Robbins, & Wold, 2018, Karabarbounis & Neiman, 2014).

In the second step, the 1999 value of the LHS of Equation (4) is divided by an arbitrary  $\gamma$  to obtain a value for the term  $(1-\rho_{1999})a_{i,1999}l_{i,1999}^{\gamma-1}$ . Then, the budget constraint, Equation (2), is used to obtain a value for  $(1-\rho_{1999})a_{i,1999}l_{i,1999}^{\gamma}$ . For the depreciation rate,  $\delta$  the value 0.0584 reported in PWT is used. Note that

$$\frac{(1-\rho_{1999})a_{i,1999}l_{i,1999}^{\gamma}}{(1-\rho_{1999})a_{i,1999}l_{i,1999}^{\gamma-1}} = l_{i,1999}.$$

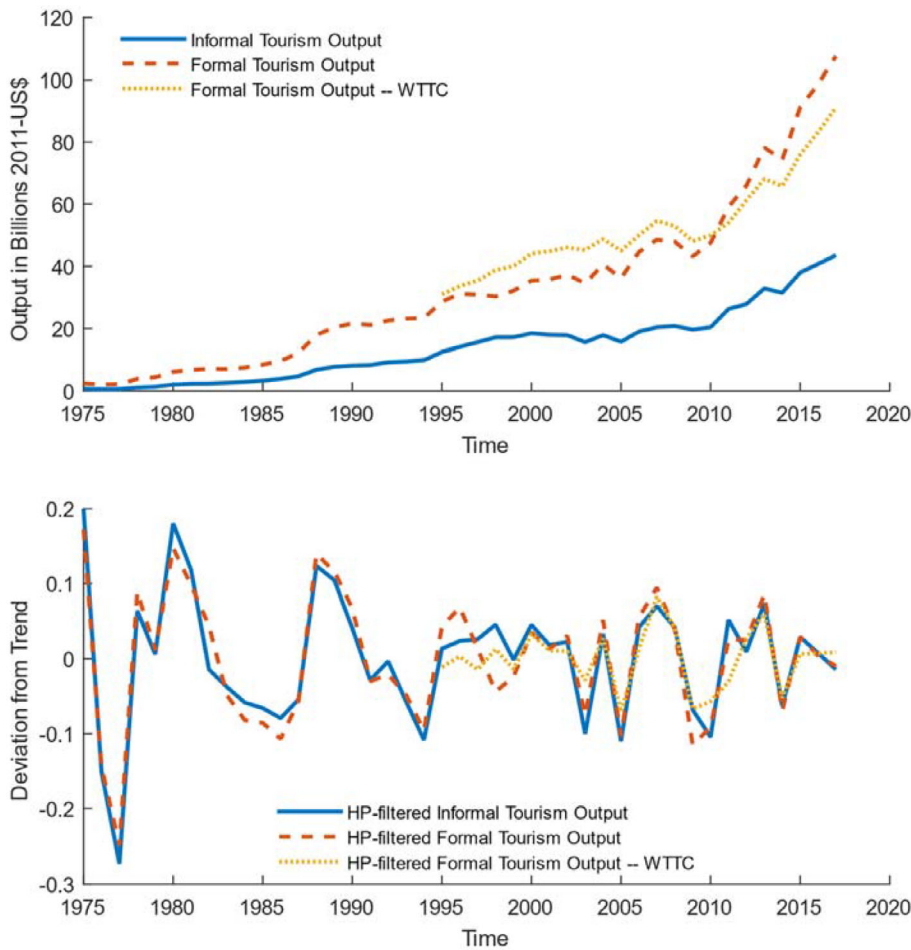
Also recall that  $y_{i,1999} = a_{i,1999}l_{i,1999}^{\gamma} = 0.534y_{f,1999}$ . Using the same arbitrary  $\gamma$  is obtained dividing this last expression by the  $l_{i,1999}^{\gamma}$  and gets  $a_{i,1999}$ . Using the value of  $a_{i,1999}$  and the growth rate of the total factor productivity in informal economy, a series of  $a_{i,t}$  is generated. Then the total factor productivity series along with our arbitrary  $\gamma$  is fed back to the series generated using the LHS of Equation (4) to obtain

$$l_{i,t} = \left( \frac{(1-\tau_t)(1-\alpha)a_{f,t}k_t^{\alpha}l_{f,t}^{1-\alpha}}{(1-\rho_t)\gamma a_{i,t}} \right)^{\frac{1}{\gamma-1}}.$$

Now both series of  $a_{i,t}$  and  $l_{i,t}$  are a function of our arbitrary  $\gamma$ . Setting  $\gamma = 0.225$  so that for  $t = 1999$ , it implies

$$\frac{a_{i,t}l_{i,t}^{\gamma}}{a_{f,t}k_t^{\alpha}l_{f,t}^{1-\alpha}} = 0.534,$$

that is the relative size of informal economy in 1999 equals the one reported in Schneider et al. (2010).



**FIGURE 2** Informal versus formal tourism output. Note: The solid line represents the size of the informal tourism output, the dashed line represents the size formal tourism output and the dotted line represents the formal tourism output in WTTC database (all in billions 2011US\$ and at constant 2011 national prices in the upper panel) [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

### 3.4 | Size of the formal and informal tourism output

Having obtained the informal GDP series, the (in)formal tourism output can now be detailed. The data of the formal tourism output (FTO) are available in the WTTC but only for post-1995 and our analysis ends in 2017 as dictated by the PWT database. Thus, there would only be 23 data points had the available tourism data been used, which, in turn, provide rather limited information for the current analysis. Therefore, an estimate of the share of FTO in the GDP of Thailand is first formed using the WDI database. From the WDI database, the data for the service exports, the share of travel services in service exports and the GDP are used to get a series of the share of travel-services-exports in the GDP (see Footnote 1). Then that share is multiplied by (a) the formal GDP series that is used above and (b) the informal GDP series that is generated above. This allows us to obtain a series (as a proxy) for the formal and informal tourism outputs starting in 1974 that is, to nearly double the length of our tourism data. The implicit assumption in obtaining the series for the informal tourism output (ITO) is that the share of the ITO in the informal GDP is *proportional* to the share of the FTO in the formal GDP. Namely,

$$\frac{\text{ITO}}{\text{informal GDP}} = \lambda \frac{\text{FTO}}{\text{formal GDP}},$$

where  $\lambda > 0$  measures the degree of the proportionality. In the results presented below,  $\lambda$  is set to 1. Because the main set of the results in the paper is based on the detrended series, those results are the same for any positive  $\lambda$ .<sup>4</sup> To see this, first, suppose that the series are detrended by first differencing. Therefore, the detrended series are simply the growth rates of the actual series. Then, note that the rate of growth from 1 to 1.1 is the same as the rate of growth from 10 to 11 or 20 to 22, and so on.

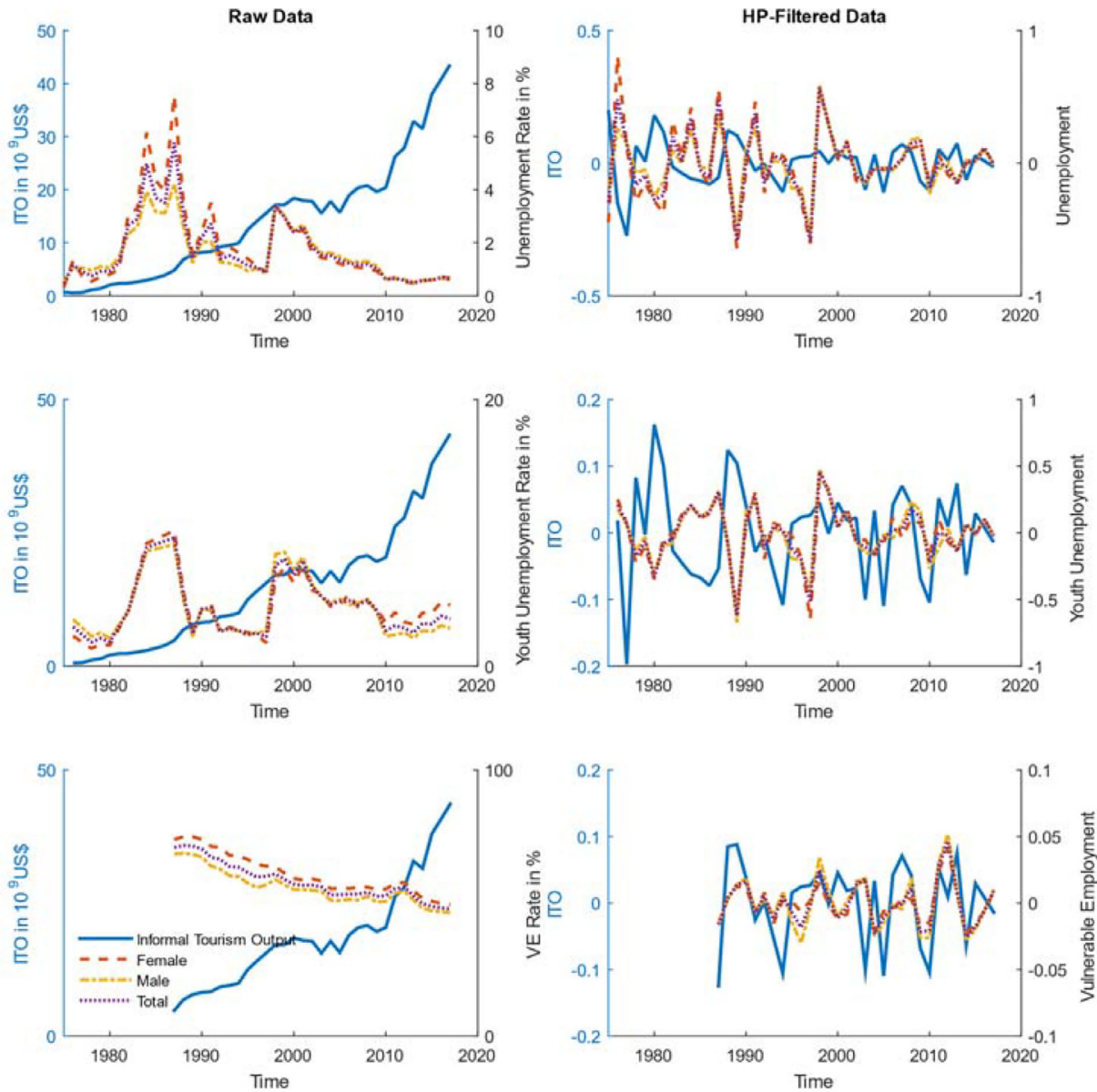
## 4 | RESULTS

### 4.1 | Formal and informal aggregate economies

The upper panel in Figure 1 depicts the evolution of the size the informal GDP relative to the formal GDP (solid line, measured in the left axis) and the formal GDP (dashed line, measured in the right axis).

It can be observed that the relative size of the informal economy reached its lowest point around mid-70's and its highest point in late 90's and overall has an upward trend. Furthermore, in periods when



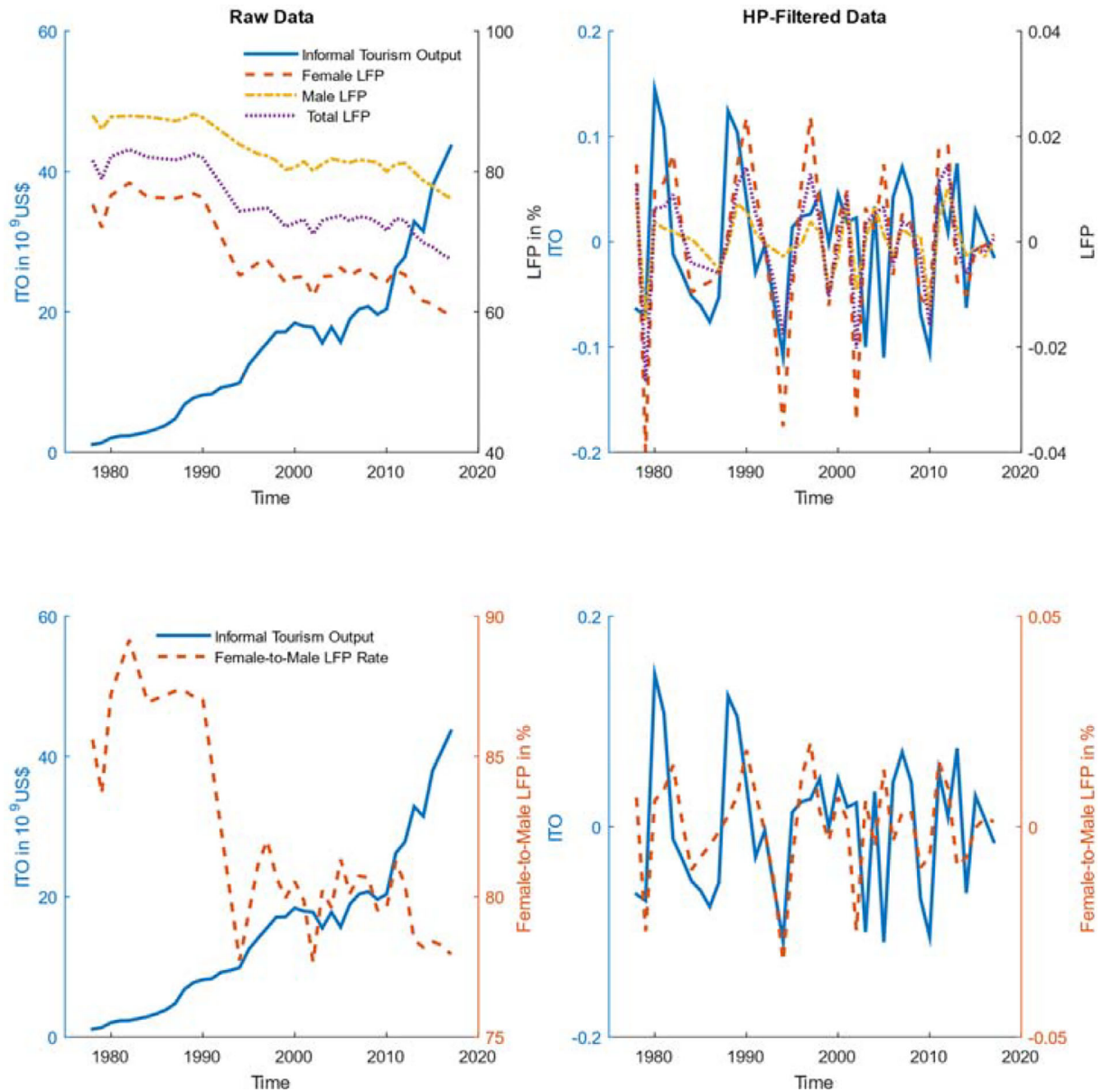


**FIGURE 3** Informal tourism output versus (un)employment. Note: The solid line represents the size of the informal tourism output (left axis in all panels; in billions 2011US\$ at constant 2011 national prices in the panels in the left column). The right axis measures: unemployment in the first row; youth unemployment in the second row and vulnerable employment in the last row. In all panels, the dashed line represents the corresponding variable for females, the dot-dashed line represents corresponding variable for males and the dotted line represents the corresponding variable for total [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

the growth rate of the formal GDP increases, the relative size of the informal GDP starts decreasing. This suggests that when the formal GDP deviates from its trend in one direction, the relative size of the informal GDP deviates from its trend in the other direction.

For comparison, the upper panel in Figure 1 also depicts the relative size of the informal GDP estimated by Schneider et al. (2010) (dotted line, measured in the left axis), which is widely used in the literature on informal economies.<sup>5</sup> Because one parameter in the model,  $\gamma$ , is set to target the relative size of the informal GDP in 1999 to that reported in Schneider et al. (2010), the two series coincide in 1999. The estimated series in our study spans 1950–2017

while that of Schneider et al. (2010) spans only 1999–2007. The two series between 2000 and 2007 have a correlation coefficient of 0.98. Both series reveal that the relative size of the informal economy decreased between 2000 and 2007. The main difference is that the rate of decrease between 2001 and 2003 is faster in our series than that in Schneider et al. (2010). Importantly, the downward trend which appears in Schneider et al.'s (2010) series is simply a result of focusing on a short period in time. Interestingly, Solis-Garcia and Xie (2018) reach a similar conclusion in their estimation of the informal economies in Argentina, Indonesia, Mexico, Turkey and Vietnam.



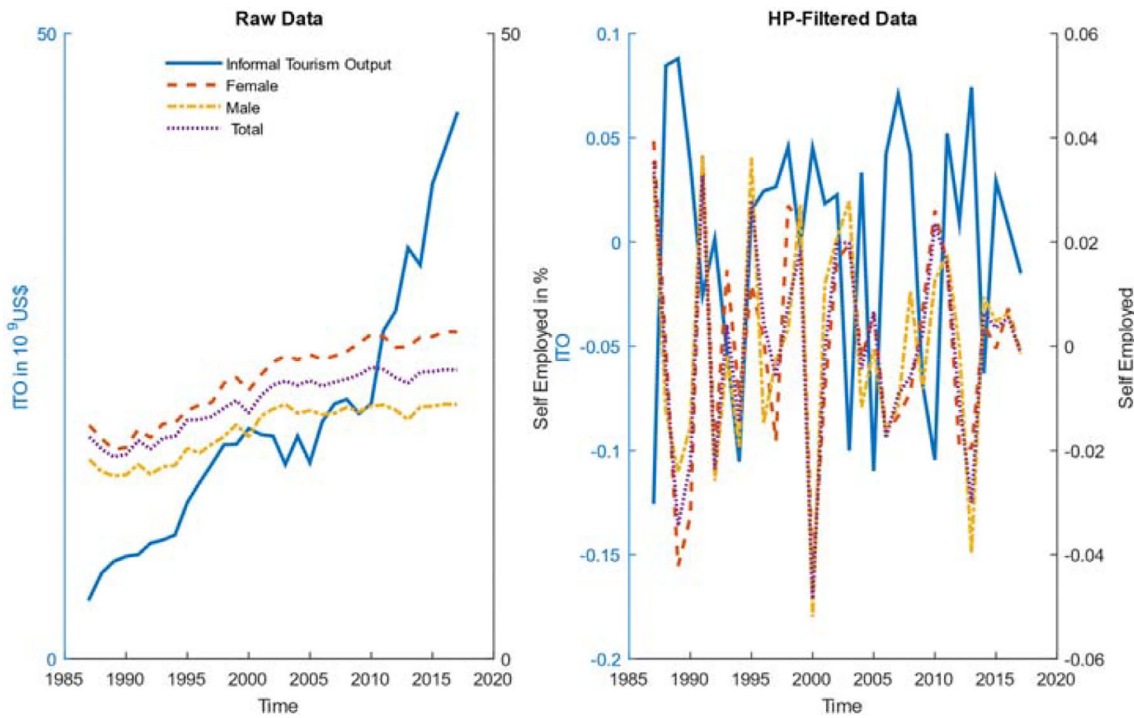
**FIGURE 4** Informal tourism output versus labour force participation. Note: The solid line represents the size of the informal tourism output (left axis in all panels; in billions 2011US\$ at constant 2011 national prices in the panels in the left column). In the upper row panels, the right axis measures: labour force participation rates of females (dashed line), males (dot-dashed line) and in total (dotted line). In the lower row panels, the right axis measures the ratio of female-to-male participation rate (dashed line) [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

The lower panel of Figure 1 depicts the detrended informal and formal GDP series. The detrended series are obtained by employing the Hodrick-Prescott (HP) filter (Hodrick & Prescott, 1997) to the natural logarithm of the two GDP series (see Footnote 3). For the HP-filter, the smoothing parameter is set to 6.25 as suggested by Ravn and Uhlig (2002) for data in annual frequencies.

Studying the lower panel of Figure 1 confirms our previous conjecture on the negative relation between formal and informal GDP series. In recessions, the relative size of the informal economy grows and in booms it shrinks. The two series has a correlation coefficient of  $-0.45$ , implying that the relative size of the informal economy is countercyclical.

#### 4.2 | Formal and informal tourism economies

Figure 2 depicts the evolutions of the informal and formal tourism outputs, as raw series in the upper panel and as detrended series in the lower panel. The fact that in both panels, FTO data compiled in the current study (dashed line) closely matches FTO data compiled by the WTTC (dotted line) verifies the methodology applied in this study. There is some slight difference between the two especially when compared in levels. Notwithstanding this, none of the results reported in this paper would qualitatively change if the WTTC data had been employed (see Footnote 4).



**FIGURE 5** Informal tourism output versus self-employed in the service sector. *Note:* The solid line represents the size of the informal tourism output (left axis in all panels; in billions 2011US\$ at constant 2011 national prices in the panels in the left column). The right axis measures the rate of self-employed people in the service sector. In all panels, the dashed line represents the corresponding variable for females, the dot-dashed line represents corresponding variable for males and the dotted line represents the corresponding variable for total [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

By looking at the upper panel of Figure 2, one observes that both informal (solid line) and formal tourism outputs steadily increase from 1975 until 2010, after which there is steep increase lasting for 3 years. The average growth rate of FTO is 11.58% while that of ITO is 10.41% between 1975 and 2017. Over the same period, the average growth rates of the formal and informal GDP are 4.27 and 5.31%, respectively.

In the lower panel of Figure 2, the detrended series of informal and formal tourism outputs move in a rather similar fashion. The informal and formal tourism output series between 1975 and 2017 have a correlation coefficient of 0.96. This strong and positive correlation of informal and formal outputs in the tourism sector is in stark contrast to the negative correlation of informal and formal GDPs. This stark contrast, in turn, suggests that the link between informal and formal parts of the economy can be very different across the sectors as compared to the aggregate economy.

### 4.3 | Tourism economy and employment

This section analyses the link between ITO and a number of important features of employment. The features analysed are unemployment, youth unemployment, vulnerable employment, LFP and the rate of self-employment in the service sector, all across genders as well. The data of these are also retrieved from the WDI.

The panels in the first two rows of Figure 3 show that the general unemployment and youth unemployment rates evolved in a similar way over the 40 years pre-2018 though the youth unemployment rates, as one expects, have been higher than the general unemployment rates.

Both youth and general unemployment rates peaked in 1980's. Female unemployment rates, youth and general, have been higher than male ones. The detrended series reveal that there is a negative correlation between ITO and unemployment rates (both youth and general). This suggests that the informal tourism economy has been absorbing the unemployed people in Thailand.

The panel in the third row left shows that vulnerable employment has been decreasing at a pace similar to that of the increase of ITO in the last 31 years pre-2018. The vulnerable employment rates are higher for males than females. The relation between detrended ITO and vulnerable employment rates positively correlate. This implies that the employment generated in the informal tourism economy is a vulnerable one.

As regards the LFP, the upper left panel in Figure 4 shows that the LFP rates have been decreasing over the last 40 years pre-2018 (the decrease is 15.93 percentage-points in females, 11.82 percentage-points for males, and 14.11 percentage points in total).

Males have been participating more than females in the formal labour market. The upper right panel shows that ITO and the LFP rates positively correlate. Though this is rather difficult to interpret,

**TABLE 3** Correlations of tourism output

Contemporaneous cross-correlations	Informal tourism output	Formal tourism output
Panel A		
Formal tourism output	0.957***	–
Informal GDP (%)	0.316**	0.116
Formal GDP (%)	0.043	0.280*
Panel B (unemployment)		
Female	–0.449***	–0.492***
Male	–0.319**	–.408***
Total	–0.395***	–.461***
Panel C (youth unemployment)		
Female	–0.331**	–0.434***
Male	–0.303*	–0.433***
Total	–0.323**	–0.445***
Panel D (vulnerable employment)		
Female	0.396**	0.405***
Male	0.381**	0.375**
Total	0.425***	0.426**
Panel E (labour force participation)		
Female	0.373**	0.380**
Male	0.345*	0.317*
Female-to-male ratio	0.322*	0.220
Total	0.346*	0.273
Panel F (self-employed in the service sector)		
Female	–0.527***	–0.587***
Male	–0.392**	–0.396**
Total	–0.500***	–0.497***

\* $p < .10$ .\*\*\* $p < .01$ .\*\* $p < .05$ .

Abbreviation: GDP, gross domestic product.

we believe that a multiplier effect is in play: as ITO and FTO behave very similarly, any development affecting FTO also affects ITO in the same direction.

The lower left panel of Figure 4 shows that the female-to-male LFP rate has been decreasing over the last 40 years pre-2018, implying that the rate of decrease has been higher in female LFP rate than the male LFP rate. The lower right panel shows that ITO and female-to-male LFP rate positively correlate, suggesting that the informal tourism economy attracts more male workers than female.

Finally, the left panel of Figure 5 shows that the rate of self-employed in the service sector has been increasing at a similar pace to that of ITO over the last 28 years pre-2018.

The rate of self-employed is higher for females than for the males. The right panel shows that the rate and ITO negatively correlate, suggesting that self-employment in the *formal* service sector absorbs the demand that boosts ITO and vice versa.

#### 4.4 | Correlation coefficients

Table 3 presents the contemporaneous cross-correlations of ITO and FTO with several variables (see Footnote 5). The current study refrains from regression analysis and opts for presenting only correlations because the former requires a concrete theory to justify the direction of the causation. Construction of such a theory is beyond the scope of the paper and left for future research. Yet, note that for a simple regression of the form  $y_i = \beta_0 + \beta_1 x_i$ , one has the relation  $\beta_1 = \text{corr}(x, y) \text{std}(y) / \text{std}(x)$  and  $\beta_0 = \text{mean}(y) - \beta_1 \text{mean}(x)$ , where  $\text{corr}$  denotes correlation and  $\text{std}$  denotes the standard deviation. Thus, the correlation values, without requiring a valid theory, presented contain information that is qualitatively equivalent to that derived from a regression and do not require a valid theory to be useful. In a way, the table summarizes the analysis above. The important points that are not detectable in the figures above but in the table are as follows:

ITO and the formal GDP are not—statistically significantly—correlated. Similarly, FTO and the informal GDP are not—statistically significantly—correlated. The relation of unemployment rates (general and youth) is slightly stronger with FTO than with ITO. Vulnerable employment, LFP and the rate of self employed in the service sector do not exhibit a significant difference in their relationship with ITO and FTO.

### 5 | SENSITIVITY ANALYSIS

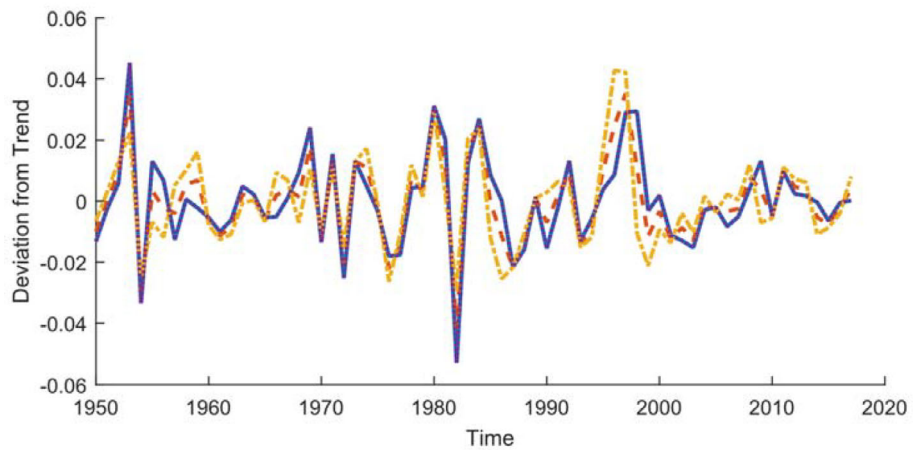
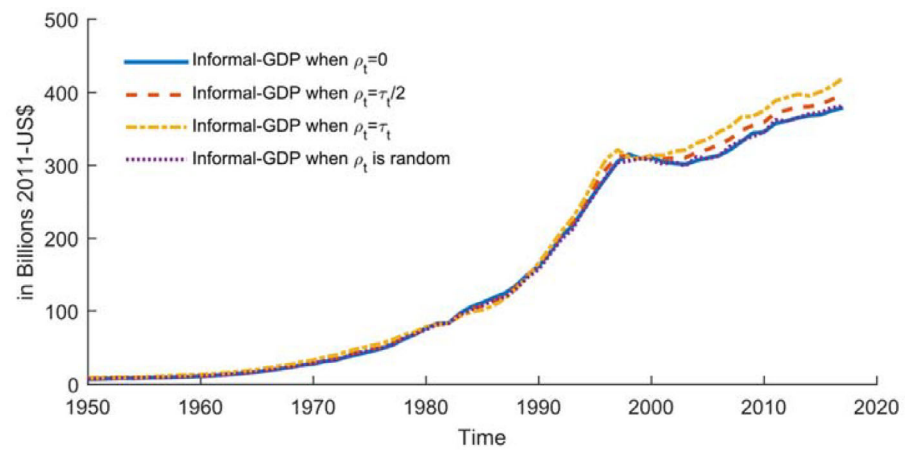
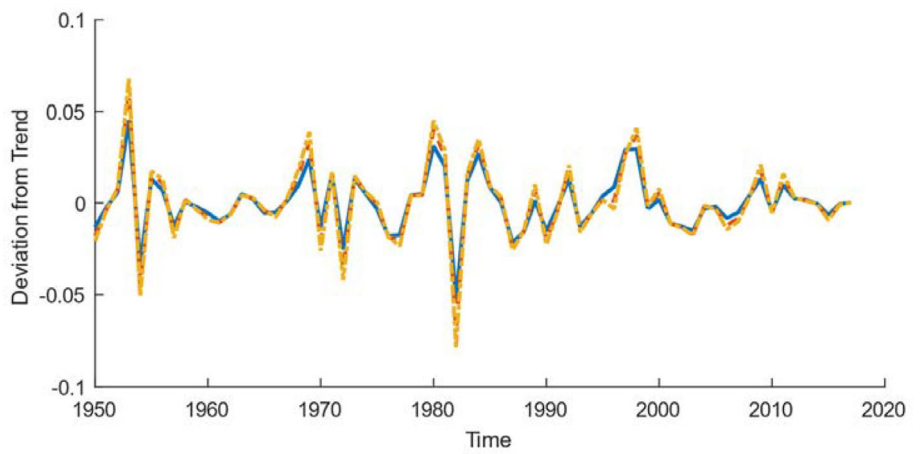
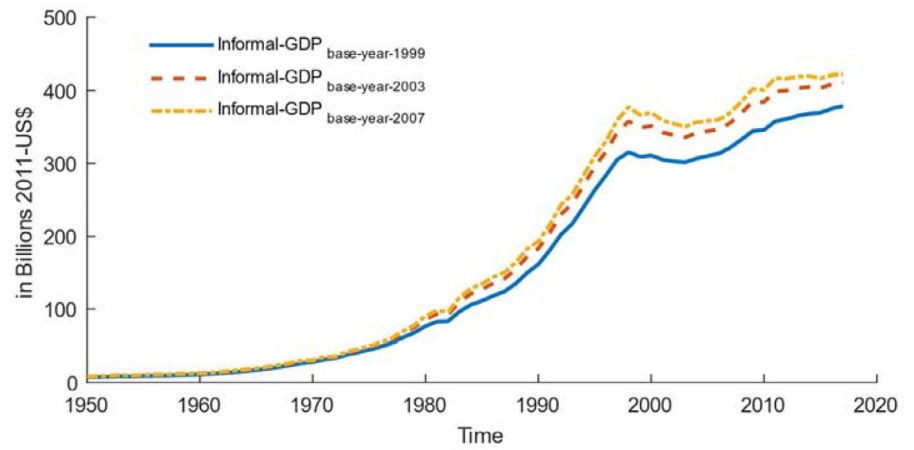
This section analyses the sensitivity of the results to the assumptions made in estimating the informal GDP, in Section 3.3. These assumptions regard the base year chosen from the estimates of Schneider et al. (2010) and the enforcement parameter,  $\rho_t$ . This section replaces each of these assumptions by some alternatives and compares the resulting estimates with the baseline case.

#### 5.1 | The role of the base year

In the baseline estimation, year 1999 value of the share of the informal GDP is chosen from the nine estimates of Schneider et al. (2010). Figure 6 presents the evolution of the informal GDP for three different base year estimates of Schneider et al.: 53.4% in 1999 (solid lined), 50.2% in 2003 (dashed line) and 48.2% in 2007 (dot-dashed line). The values set for  $\gamma$  are 0.225 (for the base year 1999), 0.278 (for the base year 2003), and 0.305 (for the base year 2007).

The upper panel shows that the values of the informal GDP shift up (especially after 1980) with the increase in the base year. The lower panel, however, shows that the detrended values of the informal GDP nearly overlap for all values of the base year considered. In other words, the detrended values of the informal GDP are robust to the chosen value of the base year.

**FIGURE 6** The role of the base year.  
 Note: The solid, dashed and dot-dashed lines represent the informal GDP for the base years 1999, 2003 and 2007, respectively [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 7** The role of  $\rho_t$  [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

## 5.2 | The role of the enforcement parameter, $\rho$

In the baseline estimation, the enforcement parameter is set to zero for all  $t$ . In addition to the baseline estimation, Figure 7 presents the evolution of the informal GDP for three alternative assumptions regarding the enforcement parameter. The first (dashed line) assumes that the enforcement parameter is the half of the tax rate,  $\rho_t = \tau_t/2$ ; the second one assumes that the enforcement parameter equals the tax rate,  $\rho_t = \tau_t$ ; and the third one assumes  $\rho_t$  is a normally distributed random variable with its mean equal to the mean of  $\tau_t$  (16.75%) and its standard deviation equal to the standard deviation of detrended  $\tau_t$  (0.68%). The values set for  $\gamma$  for each assumption are 0.19, 0.15 and 0.17, respectively. The series exhibit some variation from the baseline and the variation is more pronounced in the least realistic case  $\rho_t = \tau_t$ : the informal sector is subject to the same tax rate as the formal sector. Even then, the detrended series has a correlation of 65% with the baseline estimates.

When the enforcement parameter is an independent random variable, the estimated series are almost identical to the baseline estimates. All in all, Figure 7 shows that the estimation procedure is robust to the assumption regarding the value of the enforcement parameter.

## 6 | CONCLUDING REMARKS

Little is known about the informal tourism economy's characteristics in the existing literature and no study has ever estimated the size of the informal tourism economy (Kedir et al., 2018). The present study offers an analysis of more than 40 years of data on formal and informal tourism market activities, estimates the size of the informal tourism economy and presents some historical trends and some major sectorial patterns in Thailand. Research estimating the general size of the informal economy at country level has identified a negative correlation between formal and informal GDPs (Schneider & Enste, 2000; Solis-Garcia & Xie, 2018). Put simply, the informal GDP is countercyclical. The results of this study support this statement, but also show that this aggregate relation does not hold at the sectoral level: formal and informal tourism outputs move rather in a similar fashion (see lower panel in Figure 2). Both formal and informal parts of tourism economy showed higher positive growth rates in the "Visit Thailand" promotional campaign year in 1987 and a year after in 1988, while both showed a negative growth rate in 1997 after the Asian economic crisis, in 2003 during the SARS outbreak and in 2014 when the last coup d'etat took place in Thailand. Hence, this study reveals that relations between informal and formal parts of tourism economy are different than in the aggregate economy.

In addition, the empirical results of this study also indicate a significant and positive correlation between the general informal economy and the informal tourism economy. Both show similar reactions to recessions and political instability, while the informal tourism economy is more affected by global crises and regional environmental disasters than the general informal economy.

The argument that the informal economy creates jobs and absorbs the unemployed workforce (ILO, 2014; Pongajarn, 2017) is supported by this study. There is a negative correlation between the informal tourism economy and unemployment rates (See panels b and c in Figure 3), which shows that the informal tourism economy absorbs the unemployed workforce and particularly female and young unemployed workers. In addition, the informal tourism economy creates jobs primarily for the poor, as it has been noted by Chen (2012) and it correlates positively and significantly with vulnerable employment. Vulnerable employees include independent workers, their unpaid family members and migrant workers, who have less chance to find a job in the formal labour markets (ILO, 2014).

A recent study shows that the ratio of women to male entrepreneurs in the informal economy is correlated with gender differences in participation in the labour market (ILO, 2018). The results indicate a similar phenomenon. While males participate more as workers in both formal and informal parts in the tourism economy, females prefer to work on a self-employed basis in the service sector.

The results of this study have significant practical implications. First, the informal tourism economy grows faster than the formal tourism and aggregate economy. Second, formal and informal tourism economies grow in parallel. Professionals and policy makers ought to shift their focus towards regulating informal activities and employment in the tourism sector separate from the informal economy in aggregate. For example, policies aiming to reduce informal tourism activities may also reduce the FTO. Third, the labour market absorption capacity of the informal tourism economy is larger than the formal tourism economy. The unemployed labour force in Thailand has a relatively higher chance to find a job in the informal tourism economy. Fourth, an increase in the informal tourism economy leads to a decrease in vulnerable employment. This suggests a remarkable proportion of labour from the disadvantaged social groups such as women, youth and migrant workers is in fact in work in the informal tourism economy and earns their livelihoods there. A policy on formalization of the informal tourism economy may have a negative influence on the developmental agenda of developing countries.

The present study offers a first estimation of the size of the informal tourism economy in a developing country. It is limited by the fact that it does not explore all the determinants of the informal tourism economy and its composition. There is a great need to further estimate the size of the informal tourism economy in other countries, and further examine the forces of the informal tourism economy that would provide detailed information of process in the informal tourism economy and its relation with the rest of the economy. Furthermore, the underlying model assumes that the behaviour of a single large household represents the demand and the supply side of the economy. Thus, this strong assumption can be relaxed by introducing heterogeneity, for example, regarding household wealth and the worker's skill set to gain further insights into the informal (tourism) economy. Yet, another fruitful path can be the development of a theory that sheds light on the direction of the causation between informal tourism and employment. Our hope is that this paper stimulates further research in these interesting but relatively unexplored areas.

## ORCID

Erdirin Çakmak  <https://orcid.org/0000-0002-2095-3234>

## ENDNOTES

- <sup>1</sup> Note that:  $\text{export-travel-services}/\text{GDP} = (\text{export-travel-services}/\text{service-exports}) \times (\text{service-exports}/\text{GDP})$ .
- <sup>2</sup> The estimation method of the informal economy applied in the current paper is similar to that in Orsi et al. (2014) and in Solis-Garcia and Xie (2018). Unfortunately, neither Orsi et al. nor Solis-Garcia and Xie provide an estimation for Thailand. We are not aware of any other work besides Schneider et al. (2010) which reports an estimate of the informal economy in Thailand. Hence, we can only contrast our estimation of the informal GDP with the estimation of Schneider et al.
- <sup>3</sup> Instead of HP-filtering the data, the first differences (the growth rates) could also be used. Yet employing the first difference method does not qualitatively alter any of the results reported in this paper. While HP-filtering is the dominant method in the economics literature, the HP-filtering method is opted for here to ease comparability.
- <sup>4</sup> It is also worth recalling that the results reported are mainly derived from detrended series implying that it is the deviations from trend (or the growth rates) that matters in our analysis but not the absolute numbers.
- <sup>5</sup> The WDI data depicted in Figures 3–5 are not uniform; some starts as late as 1987.

## REFERENCES

- Adams, R. (2011). Evaluating the economic impact of international remittances on developing countries using household surveys: A literature review. *The Journal of Development Studies*, 47(6), 809–828.
- Ahlstrom, D., & Ding, Z. (2014). Entrepreneurship in China: An overview. *International Small Business Journal*, 32(6), 610–618.
- Antonakakis, N., Dragouni, M., & Filis, G. (2015). Tourism and growth: The times they are a-changing. *Annals of Tourism Research*, 50, 165–169.
- Bank of Thailand (2019). Thailand remittances. Retrieved from <https://tradingeconomics.com/thailand/remittances>
- Beirman, D. (2016). *Challenging times for Thai tourism*. Retrieved from <https://www.newmandala.org/challenging-times-for-thai-tourism/>
- Biggs, D., Hall, C. M., & Stoeckl, N. (2012). The resilience of formal and informal tourism enterprises to disasters: Reef tourism in Phuket, Thailand. *Journal of Sustainable Tourism*, 20(5), 645–665.
- Brata, A. G. (2010). Vulnerability of urban informal sector: Street vendors in Yogyakarta, Indonesia. *Theoretical and Empirical Researches in Urban Management*, 5(14), 47–58.
- Çakmak, E., Lie, R., & McCabe, S. (2018). Reframing informal tourism entrepreneurial practices: Capital and field relations structuring the informal tourism economy of Chiang Mai. *Annals of Tourism Research*, 72, 37–47.
- Çakmak, E., Lie, R., & Selwyn, T. (2019). Informal tourism entrepreneurs' capital usage and conversion. *Current Issues in Tourism*, 22(18), 2250–2265.
- Chanwanpen, K. (2018). World Bank report urges Thailand to revisit migrant worker policies to pursue 4.0 growth strategy. *The Nation*, May 17.
- Chen, M.A. (2012). The informal economy: Definitions, theories and policies. WIEGO Working Paper Series, 1(26), 90141–90167.
- Crick, M. (1992). Life in the informal sector: Street guides in Kandy, Sri Lanka. In D. Harrison (Ed.), *Tourism and less developed countries* (pp. 135–147). London, England: Belhaven Press.
- Cukier, J. (2002). Tourism employment issues in developing countries: Examples from Indonesia. In R. Sharpley & D. J. Telfer (Eds.), *Tourism and development: Concepts and issues* (pp. 165–201). Clevedon, England: Channel View.
- Daelen, L., & Vasuprasat, P. (2010). *Migrant workers' remittances from Thailand to Cambodia, Lao PDR and Myanmar: Synthesis report on survey findings in three countries and good practices*. ILO Regional Office for Asia and the Pacific (p. 40). Bangkok, Thailand: ILO.
- Dahles, H., & Prabawa, T. S. (2013). Entrepreneurship in the informal sector. The case of the pedicab drivers of Yogyakarta, Indonesia. *Journal of Small Business and Entrepreneurship*, 26(3), 241–259.
- Damayanti, M., Scott, N., & Ruhanen, L. (2017). Coopetitive behaviours in an informal tourism economy. *Annals of Tourism Research*, 65, 25–35.
- De Jong, G. F. (2000). Expectations, gender, and norms in migration decision-making. *Population Studies*, 54(3), 307–319.
- De Paula, A., & Scheinkman, J.A. (2007). The informal sector (no.13486). *National Bureau of Economic Research*.
- De Soto, H. (1989). *The other path: The invisible revolution in the third world*. New York, NY: Harper & Row.
- De Soto, H. (2002). *The other path: The economic answer to terrorism*. New York, NY: Basic Books.
- Djankov, S., Glaeser, E., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2003). The new comparative economics. *Journal of Comparative Economics*, 31(4), 595–619.
- Eggertsson, G., J. Robbins, and E. Wold. (2018). Kaldor and Piketty's Facts: The Rise of Monopoly Power in the United States, National Bureau of Economic Research Working Paper.
- Estrin, S., & Mickiewicz, T. (2012). Shadow economy and entrepreneurial entry. *Review of Development Economics*, 16(4), 559–578.
- Euromonitor International (2018). *Travel in Thailand - country report* (October 2018). London: England.
- European Commission (2007). Stepping up the fight against undeclared work. Brussels: European Commission.
- Feenstra, R., Inklaar, R., & Timmer, M. (2015). The next generation of the Penn world table. *American Economic Review*, 105(10), 3150–3182.
- Geertz, C. (1963). *Peddlers and princes: Social change and economic modernization in two Indonesian towns*. Chicago, IL: Chicago University Press.
- Gilbert, A. (1998). *The Latin American city*. London: Latin American Bureau.
- Godfrey, P. C. (2011). Toward a theory of the informal economy. *The Academy of Management Annals*, 5(1), 231–277.
- Hawkins, D. E., & Mann, S. (2007). The World Bank's role in tourism development. *Annals of Tourism Research*, 34(2), 348–363.
- Henderson, J. C., & Smith, R. A. (2009). The informal tourism economy at beach resorts: a comparison of Cha-Am and Laguna Phuket in Thailand. *Tourism Recreation Research*, 34(1), 13–22.
- Hodrick, R. J., & Prescott, E. C. (1997). Postwar US business cycles: An empirical investigation. *Journal of Money, Credit and Banking*, 29(1), 1–16.
- Ihrig, J., & Moe, K. S. (2004). Lurking in the shadows: The informal sector and government policy. *Journal of Development Economics*, 73(2), 541–557.
- International Labour Organization (ILO). (2002). *Women and men in the informal economy: A statistical picture* (1st ed.). Geneva: International Labour Organization.
- International Labour Organization (ILO). (2014). *Women and men in the informal economy: A statistical picture*. 2nd ed. Retrieved from [https://www.ilo.org/stat/Publications/WCMS\\_234413/lang-en/index.htm](https://www.ilo.org/stat/Publications/WCMS_234413/lang-en/index.htm)
- International Labour Organization (ILO). (2018). *Women and men in the informal economy: A statistical picture*. 3rd ed.
- Isachsen, A. J., & Strøm, S. (1985). The size and growth of the hidden economy in Norway. *Review of Income and Wealth*, 31(1), 21–38.
- Jones, T., Mondar, R., & Edwards, P. (2006). Shades of grey in the informal economy. *International Journal of Sociology and Social Policy*, 26, 353–373.
- Karabarbounis, L., & Neiman, B. (2014). The global decline of the labor share. *Quarterly Journal of Economics*, 129(1), 61–103.
- Kedir, A. M., Williams, C., & Altnay, L. (2018). Services industries and the informal economy: An introduction. *The Service Industries Journal*, 38(11–12), 645–649.

- Klador, N. (1963). Capital Accumulation and Economic Growth. In F. A. Lutz & D. C. Hague (Eds.), *Proceedings of a Conference Held by the International Economics Association*. London, England: Macmillan.
- Levy, S. (2010). *Good intentions, bad outcomes: Social policy, informality, and economic growth in Mexico*. Washington DC: Brookings Institution Press.
- Meyer, G. (2006). *Formal institutions and informal politics in central and eastern Europe: Hungary, Poland, Russia and Ukraine* (2nd ed.). Opladen: Barbara Budrich.
- Mora-Rivera, J., Cerón-Monroy, H., & García-Mora, F. (2019). The impact of remittances on domestic tourism in Mexico. *Annals of Tourism Research*, 76, 36–52.
- Ngoasong, M. Z., & Kimbu, A. N. (2016). Informal microfinance institutions and development-led tourism entrepreneurship. *Tourism Management*, 52, 430–439.
- Oppermann, M. (1993). Tourism space in developing countries. *Annals of Tourism Research*, 20(3), 535–556.
- Orsi, R., Raggi, D., & Turino, F. (2014). Size, trend, and policy implications of the underground economy. *Review of Economic Dynamics*, 17(3), 417–436.
- Pécot, M., Gavilanes, J., & De Viteri, A. S. (2018). Tales of informality: Tourism development in four Ecuadorian beaches. *Tourism Planning and Development*, 15(5), 584–599.
- Pedersen, S. (2003). The shadow economy in Germany, Great Britain and Scandinavia: A measurement based on questionnaire service. Study no.10. The Rockwoll foundation research unit: Copenhagen.
- Perkins, D. H., Radelet, S., Block, S. A., & Lindauer, D. L. (2012). *Economics of development*. New York, NY: W.W. Norton & Company.
- Pongajarn, C. (2017). Tourism destination development in Thailand. (PhD dissertation), Wageningen University and Research, Wageningen.
- Ravn, M. O., & Uhlig, H. (2002). On adjusting the Hodrick-Prescott filter for the frequency of observations. *Review of Economics and Statistics*, 84(2), 371–376.
- Rogerson, C. M. (2018). Informal sector city tourism: Cross-border shoppers in Johannesburg. *GeoJournal of Tourism and Geosites*, 22(2), 381–392.
- Schneider, F., Buehn, A., & Montenegro, C. (2010). Shadow economies all over the World: New estimates for 162 countries from 1999 to 2007. Policy Research Working Paper, 5356. World Bank.
- Schneider, F., & Enste, D. H. (2000). Shadow economies: Size, causes, and consequences. *Journal of Economic Literature*, 38(1), 77–114.
- Schneider, F., & Enste, D. H. (2013). *The shadow economy: An international survey*. Cambridge: Cambridge University Press.
- Sinclair, M. T. (1998). Tourism and economic development: A survey. *The Journal of Development Studies*, 34(5), 1–51.
- Slocum, S. L., Backman, K. F., & Robinson, K. L. (2011). Tourism pathways to prosperity: Perspectives on the informal economy in Tanzania. *Tourism Analysis*, 16(1), 43–56.
- Solis-Garcia, M., & Xie, Y. (2018). Measuring the size of the shadow economy using a dynamic general equilibrium model with trends. *Journal of Macroeconomics*, 56, 258–275.
- Solomon, O. H. (2011). Accounting for the size of the informal sector in Nigeria. *South African Journal of Economics*, 79(4), 470–489.
- Tang, C. F., & Tan, E. C. (2015). Does tourism effectively stimulate Malaysia's economic growth? *Tourism Management*, 46, 158–163.
- Tangworamongkon, C. (2014). Street vending in Bangkok: Legal and policy frameworks, livelihood challenges and collective responses. WIEGO law and informality resources. Cambridge, MA: WIEGO.
- The Organisation for Economic Co-operation and Development, (2012). Reducing opportunities for tax non-compliance in the underground economy. Paris: OECD.
- Tourism Authority of Thailand (TAT). 2018. Annual Report 2017.
- Truong, V. D. (2018). Tourism, poverty alleviation, and the informal economy: The street vendors of Hanoi, Vietnam. *Tourism Recreation Research*, 43, 52–67.
- Trupp, A., & Sunanta, S. (2017). Gendered practices in urban ethnic tourism in Thailand. *Annals of Tourism Research*, 64, 76–86.
- Wahnschaft, R. (1982). Formal and informal tourism sectors: A case of Pattaya, Thailand. *Annals of Tourism Research*, 9, 429–451.
- Wan, G., & Sebastian, I. (2011). Poverty in Asia and the Pacific: An update. Asian Development Bank economics working paper no. 267. Retrieved from <https://doi.org/10.2139/ssrn.1919973>
- Webb, J. W., Bruton, G. D., Tihanyi, L., & Ireland, R. D. (2013). Research on entrepreneurship in the informal economy: Framing a research agenda. *Journal of Business Venturing*, 28(5), 598–614.
- Webb, J. W., Tihanyi, L., Ireland, R. D., & Sirmon, D. G. (2009). You say illegal, I say legitimate: Entrepreneurship in the informal economy. *Academy of Management Review*, 34(3), 492–510.
- Williams, C. C. (2005). Spatial variations in the nature of undeclared work and its public policy implications. *Space and Polity*, 9, 135–147.
- Williams, C. C. (2008). Beyond necessity-driven versus opportunity-driven entrepreneurship: A study of informal entrepreneurs in England, Russia and Ukraine. *The International Journal of Entrepreneurship and Innovation*, 9(3), 157–165.
- Williams, C.C. (2017). Developing a holistic approach for tackling undeclared work. Brussels: European Commission.
- Williams, C. C., & Horodnic, I. (2018). Extent and distribution of unregistered employment in the service industries. *The Service Industries Journal*, 38(11–12), 856–874.
- World Travel and Tourism Council (WTTTC) (2019). One in five Thai baht spent is in Travel & Tourism, according to new WTTTC research.
- Yotsumoto, Y. (2013). Formalization of urban poor vendors and their contribution to tourism development in Manila, Philippines. *International Journal of Japanese Sociology*, 22(1), 128–142.
- Young, M. N., Ahlstrom, D., Bruton, G. D., & Rubanik, Y. (2011). What do firms from transition economies want from their strategic alliance partners? *Business Horizons*, 54(2), 163–174.

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