Computable general equilibrium estimates of the impact of the Bali bombing on the Indonesian economy

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ABSTRACT

This article employs a multi-regional computable general equilibrium model of the Indonesian economy to estimate the short-run effect of a decline in tourism following the 2002 Bali bombings on the Indonesian economy. Our results suggest that of Indonesia's 26 provinces, GDP in Bali is worst affected by a negative shock to tourism exports followed by other popular tourist destinations, such as Jakarta and Yogyakarta. Within Bali we find that the tourism-related and non-tradable sectors contain the worst affected industries while export-oriented industries, such as textiles, clothing and footwear, and import-competing industries, such as machinery and electronics expand.

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1. Introduction

In October 2002 explosions in Kuta in Bali killed over 200 people, most of whom were foreign tourists. As a consequence, tourist arrivals to Bali declined. In the 12 months preceding the bombing (October 2001–September 2002) direct tourist arrivals in Bali were 1.4 million. In the 12 months following the bombing (November 2002–October 2003) direct tourist arrivals in Bali were 1.1 million (Department of Justice, 2004). In the wake of the bombings the Indonesian government spent $US200 million to promote Bali as a tourist destination. As a result, there was a distinct improvement in international tourist arrivals from June 2003. The immediate effect of the bombings on direct tourist arrivals to Bali is more stark if we compare the six months prior to the bombing with the six months following the bombing. In the six months prior to the bombing (April 2002–September 2002) tourist arrivals in Bali were 813,000, while in the six months following the bombing (November 2002–April 2003) tourist arrivals in Bali were 350,000 (Department of Justice, 2004).

Following the initial pick-up in international tourist arrivals in the second half of 2003, visitor arrivals and occupancy rates continued to increase throughout 2004 and the first half of 2005. By the first six months of 2005 the hotel occupancy rate was above 60%, approaching that which existed before the bombings. However, just as the tourist industry was rebounding, in October 2005, there were further bombings in Kuta and Jimbaran that killed 23 people including the bombers. Following the second bombings, the average hotel occupancy rate fell to 30–40% (Jakarta Post, 2006).

Existing studies of tourism in Bali or Indonesia more generally are primarily descriptive. Studies by economists have focused on the role of tourism as a vehicle to promote economic growth and reduce poverty (see e.g. Booth, 1990; Hitchcock, 2000; Jayasuriya & Nehen, 1989; Shah & Gupta, 2000). Studies by anthropologists have concentrated on how to manage conflict between tourism and indigenous culture (Lietaer & De Meulenaere, 2003; McTaggart, 1980). One related statistical study is Tan, McMahon, and Miller (2002). These authors examine the determinants of tourist flows to Malaysia and Indonesia from six major markets: namely, Australia, Germany, Japan, US, UK and Singapore over the period 1980–1999, finding that real income in the source markets and price competitiveness of the destinations are important determinants of demand.

There are very few studies of the impact of the Bali bombings on the Balinese economy. Of those studies, most have argued that the Balinese economy is over reliant on tourism and that the downturn in international tourist arrivals following the bombings highlights the urgent need for the Balinese economy to become more diversified (Martana, 2003; McRae, 2005; Robinson & Meaton, 2005; World Bank/UNDP, 2006). This perspective was questioned by Smyth, Nielsen, and Mishra (in press) who applied unit root tests to the time series of international tourist arrivals to Bali to ascertain if shocks to tourist arrivals are permanent or transitory. The results from that study suggest that the effects of the Bali bombings on the growth path of tourist arrivals from Bali's major markets are only transitory and that, therefore, Bali's tourism sector is sustainable in the long run.

The purpose of this article is to simulate the short-run economic effects of the Bali bombing using the EMERALD multi-regional

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computable general equilibrium model of Indonesia. We use a computable general equilibrium model because it allows us to simulate the effect of a decline in tourism exports in Bali to countries outside Indonesia not only on the tourism sector in Bali, but also on other industries both in Bali and other provinces of Indonesia. We focus on the short-run effects of the bombing because in the short-run capital stock is assumed to be fixed, which means we can isolate the impact of the Bali bombing on the Indonesian economy resulting from a decrease in tourism exports to other countries rather than the combined effect of a decrease in tourism exports to other countries and investment outflow. There are very few computable general equilibrium based studies of the macro-economic effects of tourism in developing countries, with the only published studies being for Fiji and Zimbabwe (see Magubu, 2002; Narayan, 2003, 2004). In addition to contributing to existing studies on the economic implications of the Bali bombing, this study contributes to this literature on computable general equilibrium modelling of tourist flows in developing countries.

2. Economic importance of tourism to Indonesia

In 2001, prior to the bombings, over 5 million international tourists visited Indonesia, representing just under 10% of Indonesia's total exports (World Bank/UNDP, 2006). While Bali only accounted for about a quarter of international tourist arrivals to Indonesia before the bombing, most tourists to Indonesia come to Bali at some point in their visit (Bali Tourism Authority, 2001). The actual workforce directly involved in tourism in Bali is not large, representing just 3.3% of Bali's workforce (World Bank, 2002). This proportion, however, understates the importance of tourism to the Balinese economy. When linkages to the related sectors of retail trade, manufacturing and construction are included, the importance of tourism to Bali's economy is more substantial. Table 1 shows inbound tourism as a share of Balinese GDP over the period 2000–2005; a period in which tourism to Bali was affected by the terrorist attack in the United States in 2001 and the Bali bombings and the outbreak of Severe Acute Respiratory Syndrome in 2002–2003. There was a fall in the proportion of inbound tourism to GDP from 20% in 2005 to 16% in 2005. Fig. 1 shows the percentage changes in the inbound tourism share in Balinese GDP from 2001 to 2005. In four of the five years, the change was negative with the biggest falls occurring in 2001–2003.

Following the first bombing, the World Bank/UNDP (2006) estimated that as many as three-quarters of those employed in the
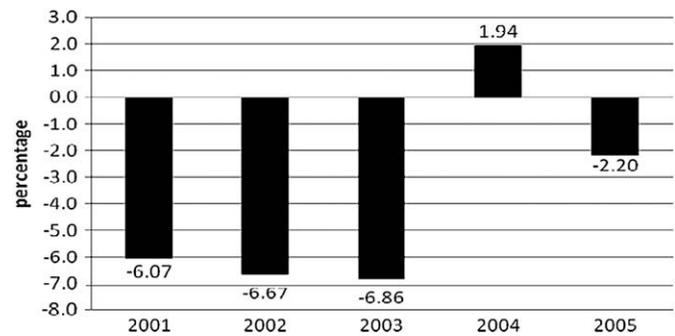

Fig. 1. Percentage changes in the inbound tourism share in Balinese GDP.

hotel sector were either working reduced shifts or had temporarily been made redundant. There were also flow-on effects to other tourist-related industries such as transport and services. For example, market traders, beach vendors and taxi drivers reported a drop in sales revenue between 32% in Pasar Badung and 71% in Pasar Ubud (World Bank/UNDP, 2006). Other provinces affected by the Bali bombings were primarily either other important tourist destinations where tourist numbers were reduced because of an increased fear of terrorism, or provinces with strong economic linkages to Bali such as East Java and West Nusa Teggara.

3. Overview of computable general equilibrium models

Computable general equilibrium models or applied general equilibrium (AGE) models are widely used to analyse the economy-wide impact of policies (Parmenter & Meagher, 1985; Powell, 1991; Powell & Lawson, 1989; Vincent, 1989). We distinguish between static models (e.g. ORANI[1] and INDORANI[2]) and dynamic models (e.g. ORANI-F and MONASH). Dynamic models are developed from static models and contain dynamic elements, arising from stock/flow accumulation between capital stocks and investment, and between foreign debt and trade deficits. We categorize computable general equilibrium models with a regional dimension as 'top-down' or 'bottom-up'. A 'top-down' model is simple in theory and requires minimal regional data with regional results merely a decomposition of national results. By contrast, in a 'bottom-up' model each region is modeled independently. There is interaction between each regional and national agent and also among regional agents. A 'bottom-up' model has sophisticated theory and requires much regional data which are rarely available (Liew, 1984).

Previous computable general equilibrium models of Indonesia such as INDORANI and INDOCEEM[3] have used the 'top-down' approach to obtain regional results. Both models are static. Studies that have employed these models include Abimanyu (2000), who analyzed the economy-wide effect of reducing import tariffs on agricultural inputs and increasing government subsidies, and Dee (1991), who examined the distributional implications of a forestry set-aside target. Other computable general equilibrium studies for

Table 1
Inbound tourism share of Balinese GDP

	2000 Billion rupiah	2001 Billion rupiah	2002 Billion rupiah	2003 Billion rupiah	2004 Billion rupiah	2005 Billion rupiah
Inbound tourism industries						
Hotels	1751.75	1815.81	1881.96	1883.45	2086.94	2376.76
Restaurant	1102.92	1216.19	1410.83	1542.75	1761.78	1998.72
Air transport	607.69	770.59	900.44	858.05	988.89	1165.44
Total	3462.37	3802.59	4193.23	4284.26	4837.62	5540.92
Balinese GDP	17,268.2	20,190.20	23,856.44	26,168.94	28,985.60	33,946.36
Share of inbound tourism in GDP, %	20.05	18.83	17.58	16.37	16.69	16.32

Source: *Bali in Figures, Statistics of Bali Province 2004–2005 and 2006*, downloadable from http://www.bps.go.id/sector/nra/grdp/table1.shtml. Hotels, restaurant and air transport are chosen to represent the inbound tourism set since most of their output are consumed by tourists. The share of inbound tourism in Balinese GDP has been calculated by multiplying the share of number international guests at Balinese hotels by the total (inbound plus domestic) tourism contribution to Balinese GDP.

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[1] ORANI is an Australian computable general equilibrium model (see Dixon, Parmenter, Sutton, & Vincent, 1982).

[2] INDORANI is an Indonesian version of the ORANI model.

[3] INDOCEEM is a version of the INDORANI computable general equilibrium model of the Indonesian economy designed especially for analyzing energy-related issues but useful also for analyzing other policy issues (http://www.monash.edu.au/policy/oranig.htm).