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Analyses of topical policy issues

Has tourism influenced Indonesia's current account?

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ABSTRACT

In this paper we study the role of tourism in explaining Indonesia's current account balance. We extend the conventional model of current account determinants by augmenting it with tourism (visitor arrivals) and expected and unexpected tourism shocks, where tourism shocks are akin to income shocks. We show that expected and unexpected positive tourism shocks improve Indonesia's current account balance, particularly in the most recent period (2010Q1–2017Q4). Equally importantly, our empirical investigation shows that the current account reacts asymmetrically to positive tourism shocks. In other words, expected tourism shocks worsen the current account when it is already in deficit and improve it when it is in surplus. Finally, we show that an unexpected tourism shock improves the account balance, regardless of whether the account is in deficit or surplus.

1. Introduction

Motivated by the growing importance of tourism to Indonesia's economy, in this paper we study the role of tourism in shaping Indonesia's current account. Our hypothesis is that tourism positively influences Indonesia's current account. Our inspiration to explore Indonesia's current account and tourism comes from two sources, and we delve into this to set the motivation. First, as Fig. 1 shows, Indonesia's current account has moved from a surplus from 1997 to 2011 to deficits. From 2011 to 2017, Indonesia's current account has been in persistent deficit, averaging 2.49% of its gross domestic product (GDP). During this period of persistent deficits, the deficits have been within the range from −4.57% to −0.82% of the GDP. Second, during the same period, visitor arrivals have grown steadily. The annual average growth in visitor arrivals has been around 8.88% from 2011 to 2017, with a record growth rate of over 20% in 2017. This growth could be one reason for the stabilization of the deficit within the range shown in Fig. 1. Whether this is the case and what role tourism plays in shaping Indonesia's current account are unknown and are, therefore, the subject of our investigation.

Why should tourism matter to the current account? The literature sees a role for tourism in facilitating trade. Kulendran and Wilson (2000), for instance, argue that international travellers to a host country have the potential to stimulate the international exchange of goods and services in the future. In support of this line of thought, Katircioglu (2009) points out that trading opportunities will arise because tourists consume certain types of goods and services when they travel. This helps develop taste, and, therefore, tourists will demand similar types of goods and services when they return home. This could potentially drive the imports of those countries from where tourists visit. Such relations can be perceived as indirect

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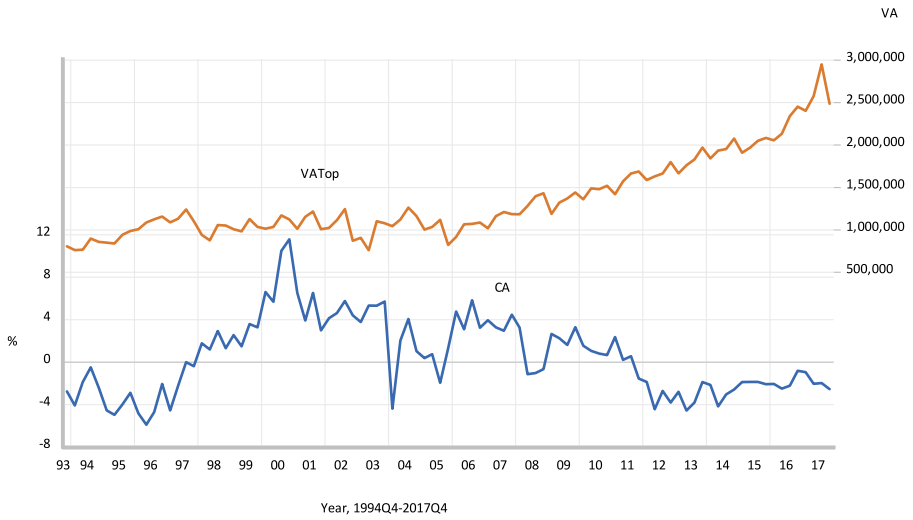

Fig. 1. Current account and visitor arrivals to Indonesia. This figure plots the current account as a percentage of GDP (CA) and visitor arrivals from Indonesia's top-14 source markets (VATOP) over the quarterly sample period (1994Q4 to 2017Q4).

ways in which tourism can instigate international trade. A direct channel of the effect is also present. As international travel develops, it creates demand for goods and services at the tourist destination country, and the destination country needs to trade to meet tourist demand. Several studies empirically show that tourism boosts international trade (e.g., Shan and Wilson, 2001; Santana-Gallego et al., 2011).

We contribute to this literature by investigating how tourism impacts the current account. Our study differs from studies that have looked at the tourism–economic growth nexus (e.g., Aratuo and Etienne, 2019). Fonseca and Sanchez-Rivero (2020) have conducted a meta-regression analysis that contains an excellent review of the literature. The overall conclusion is that tourism promotes economic growth. In a departure from the heavily crowded field of tourism growth research, studies have examined how tourism influences exchange rates. This literature shows that tourism can lead to both depreciation and appreciation of the host country's exchange rate, depending on its state of tourism development (Thompson and Thompson, 2010; Cheng et al., 2013). Finally, as alluded to above, the literature on the association between tourism and international trade finds clear evidence that tourism boosts international trade.

No study, however, has considered how tourism influences a country's current account, despite strong evidence of a relation between tourism and international trade. We contribute to this literature by showing that tourism also matters to the host country's current account balance. Using Indonesian data, we show that both expected and unexpected positive tourism shocks improve current account balances. We also unravel asymmetry in the response of Indonesia's current account to tourism shocks. Specifically, we discover that expected tourism shocks worsen the current account if it is already in deficit and improve it when it is in surplus. Finally, we find that an unexpected tourism shock improves the account balance, regardless of whether the account is in deficit or surplus.

The remainder of the paper proceeds as follows. Section 2 presents the augmented current account model. It also develops our tourism-oriented current account model. Section 3 discusses the data and the empirical results. The final section draws concluding remarks.

2. Tourism–current account model

Modern current account theory proposes that the terms of trade (*TOT*), domestic gross domestic product (*GDP*), world GDP (*WGDP*), real interest rate (*RIR*), and real exchange rate (*REER*) are key predictors of the current account, *CA* (e.g., Ahmed and Park, 1994; Hossain, 1999; Cashin and Mcdermott, 2002; Kaufmann et al., 2002; Chinn and Prasad, 2003; Kent and Cashin, 2003). We use these as a basis for our empirical work and propose a set of regressions that also serve the purpose of establishing the robustness of our conclusions:

$$CA_t = \alpha_1 + \beta_{11} X_t + \varepsilon_{1t} \quad (1)$$

$$CA_t = \alpha_1 + \beta_{11} X_t + \beta_{12} VAT_t + \varepsilon_{2t} \quad (2)$$

$$CA_t = \alpha_3 + \beta_{31} X_t + \beta_{32} VATOP_t + \varepsilon_{3t} \quad (3)$$

$$CA_t = \alpha_4 + \beta_{41} X_t + \beta_{42} VAO_t + \varepsilon_{4t} \quad (4)$$

$$CA_t = \alpha_1 + \beta_{51} X_t + \beta_{52} VAT\_EXP_t + \beta_{53} VAT\_UNEXP_t + \varepsilon_{5t} \quad (5)$$

$$CA_t = \alpha_3 + \beta_{61}X_t + \beta_{62}VATOP\_EXP_t + \beta_{63}VATOP\_UNEXP_t + \varepsilon_{6t} \quad (6)$$

$$CA_t = \alpha_4 + \beta_{71}X_t + \beta_{72}VAO\_EXP_t + \beta_{73}VAO\_UNEXP_t + \varepsilon_{7t} \quad (7)$$

where Eq. (1) is the conventional current account determinants model, with *CA* representing current account as a percentage of the GDP; Eqs. (2) to (7) are simply augmented versions of Eq. (1), motivated, as discussed in Section 1, by international trade theory; Eq. (2) includes visitor arrivals total (*VAT*); Eq. (3) considers only visitor arrivals from Indonesia's top 14 tourism source markets (*VATOP*), which we consider because they account for 83.7% of all visitor arrivals in Indonesia; Eq. (4) can be interpreted as an extension of Eq. (3), covering those source markets not covered in Eq. (3) that influence the current account (*VAO*); and Eqs. (5) to (7) consider the effect of shocks to tourism on the current account.

Because this analysis is based on shocks, we consider these models to be the main regressions testing our proposed hypothesis. We identify shocks in the following manner. We run a first-order autoregressive (AR(1)) model of *VAT*, *VATOP*, and *VAO*. Expected tourism shocks (*EXP*) are simply the fitted values from this AR(1) model, while the unexpected tourism shocks (*UNEXP*) are the residuals from this AR(1) model. In capturing dynamic effects, a maximum of two lags based on the Schwarz information criterion is considered in all the regressions. Finally, the vector X_t contains theoretically expected determinants of the current account, namely, *REER*, *TOT*, government spending (*GS*), and *RIR*. In addition to these determinants, as part of robustness tests, we control for Indonesia's GDP growth and *WGDP*.

The following explains the model. The inclusion of tourism, our key variable, as a determinant in the current account model is motivated by a well-established theoretical literature on the implications of changes in income or of income shocks on the current account (Obstfeld, 1982; Svennson and Razin, 1983; Pitchford, 1989). Our study measures tourism's effects on the current account through visitor arrivals or expected and unexpected visitor arrival shocks, consistent with rational expectation studies that show that unexpected (i.e., not expected) income shocks influence the current account (Persson and Svensson, 1985; Rodriguez, 1980; Dornbusch, 1976). This motivates our approach of decomposing tourism shocks into expected and unexpected shocks.

Consistent with current account theory, we also control for other types of income shocks, namely, *TOT* shocks. The theory is well known, and we refer to the work of Laursen and Metzler (1950).

The real exchange rate is another proxy for income shock. Multiple theories have been developed to motivate the role of exchange rates in influencing the current account. We refer here to the well-known J-curve hypothesis, Mundell and Fleming's model, and the portfolio balance approach (Greenwood, 1983).

The interest rate is also regarded to be an important factor, particularly in relation to the flow of funds, given Mundell and Fleming's model (see also Kaufmann et al., 2002; Dibooglu, 1997).

The current account can also be affected by shocks originating in other countries, mainly trading partner countries. Dibooglu (1997) and Kaufmann et al. (2002) find empirical evidence of this effect. We therefore control for this factor by using *WGDP*. In some of the regression models, we also use *GS* as a determinant of *CA*.[1] Mundell and Fleming's model motivates our inclusion of *GS* as a control variable.

3. Empirical analysis

3.1. Data

The study employs two data sets. The first data set contains quarterly data relating to the current account model. The study's time frame is dictated by the availability of consistent time series data. The estimation of Eqs. (1) to (4) utilizes the common sample period 2010Q1 to 2017Q4, with the vector *x* including *GS*; otherwise, the estimation uses the period sample 1993Q1 to 2017Q4. These data are sourced from the International Monetary Fund's International Financial Statistics, the World Bank's online database, Bank Indonesia, CEIC Data, and the Indonesian Central Bureau of Statistics. Table 1 indicates the data source of the variables.

3.2. Common statistics: The current account model

Descriptive statistics and preliminary results of the data analysis are reported in Table 2. Our current account model is examined for two subperiods, 1993Q1–2017Q4 (sample 1) and 2010Q1–2017Q4 (sample 2), due to data issues, and we arrive at two different conclusions over the two periods for the variables of the current account model. We explain these next.

First, from 1993 to 2017, the *CA* value is positive, at 1.3%, on average, whereas, from 2010 to 2017, *CA* is −1.7%. This result means that, on average, the current account has a surplus more often in sample 1 than in sample 2 (see Fig. 2). Fig. 2 shows that Indonesia's current account was in deficit from 1981Q1 to 1997Q4, mostly had a surplus from 1998Q1 to 2011Q3, and went into deficit again from 2011Q4 to 2017Q4.

Second, Indonesia's output growth has been stronger in recent years, compared to earlier years. Hence, the sample period 1993–2017 exhibits a mean growth rate of 4.2%, whereas the period 2010–2017 shows a mean growth rate of

[1] Only very limited data are available, from 2010Q1 to 2017Q4, and their inclusion is the reason for dividing our analysis into two subsamples.

Table 1
Data definitions and sources. This table reports data, their definitions and data source.

Variable	Description	Source
CA	Current account deficit as a percentage of GDP (%)	CEIC International Financial Statistics
GDP	GDP growth rate of Indonesia (%)	Bank Indonesia
GDPW	World GDP — Nominal; expressed as growth rates (%)	Global Financial Database
GS	Government Budget as a percentage of GDP (%)	Bank IndonesiaIFS
REER	Real Effective Exchange rate (index; base year: 2010)	Global Financial Database
RIR	Three months nominal inter-bank rate (Indonesia); inflation accounted (Year-on-Year rate)	Global Financial Database
TOT	Terms of Trade ratio	Global Financial Database
VAT	Visitors Arrivals: Total (Persons)	Central Bureau of Statistics
VATOP	Visitor arrive by top 14 source markets (Persons)	Central Bureau of Statistics
VAO	Visitor arrive from source markets other than the Top 14 source markets(Persons)	Central Bureau of Statistics

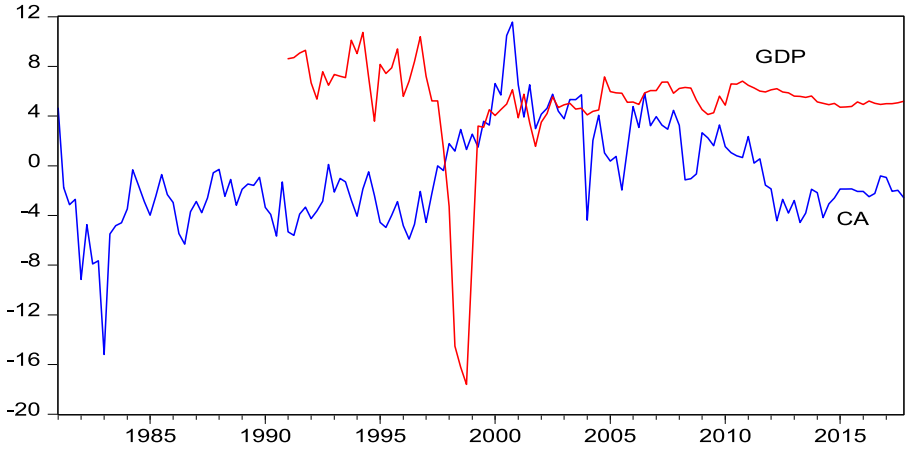

Fig. 2. Indonesia's current account and GDP growth. This figure plots the current account as a percentage of GDP (*CA*) and Indonesia's GDP growth (*GDP*) over the quarterly sample period (1981Q1 to 2017Q4).

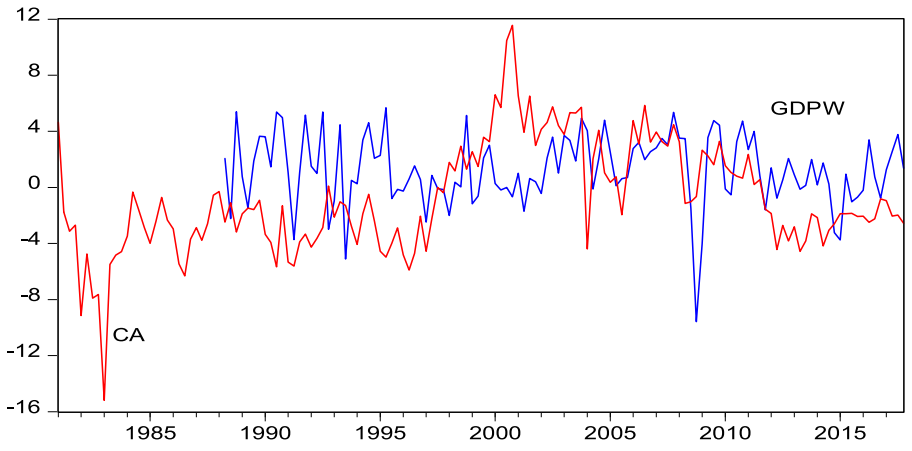

Fig. 3. Current account and foreign income growth. This figure plots the current account as a percentage of GDP (*CA*) and World GDP growth (*GDPW*) over the quarterly sample period (1981Q1 to 2017Q4).

5.5%. In contrast, world growth is higher from 1993 to 2017, with an average growth rate of 1.2%, compared to 0.8% from 2010 to 2017. An examination of domestic and foreign outputs against Indonesia's current account balance in Figs. 2 and 3, respectively, suggests the likelihood of a negative relation between Indonesia's output growth and the current account, whereas foreign output seems to be positively related to Indonesia's current account balance.

Third, on average, the *REER* and *RIR* values in sample 2 are 15.8% and 48.2% higher, respectively, compared to sample 1. Meanwhile, *TOT* is reduced in sample 2 by 11.7%, on average. Note that an increase in the *REER* value suggests a depreciation of the rupiah against a basket of trading partner currencies. This means that the rupiah is depreciated in sample 2 compared to sample 1. These variables are captured over time (see Figs. 4 to 6), together with Indonesia's current

Table 2
Descriptive statistics: Current account and its determinants. The *p*-values associated with the augmented Dicky–Fuller (ADF) unit root test and Jarque–Bera (JB) normality test are given in parenthesis. The descriptive statistics, except those relating to the ADF test, are based on raw data. For the ADF test, the variables *CA, GDP, GDPW* and *RIR* are % values and the rest of the variables (*REER, TOT, VAO, VATOP* and *VAT*) are in logarithmic form.

Summary	*CA*	*GDP*	*WGDP*	*REER*	*TOT*	*RIR*	*GS*	*VAO*	*VATOP*	*VAT*
Panel A: Sample 1 (1993Q4–2017Q4)										
Mean	1.270	4.150	1.218	99.474	1.125	1.030		286 556	1 348 400	1 634 956
Std. Dev.	3.467	4.469	2.435	17.711	0.151	6.602		184 725	471 830	648 794
CV	2.731	1.077	2.000	0.178	0.134	6.407		0.645	0.350	0.397
JB	2.073	876.624	54.373	15.470	7.441	1073.088		136.594	24.941	43.728
	(0.355)	(0.000)	(0.000)	(0.000)	(0.024)	(0.000)		(0.000)	(0.000)	(0.000)
ADF stat	−3.047**	−3.961***	−6.547***	−3.301	−1.995	−5.989		2.695	0.072	0.882
(I(0))	(0.034)	(0.002)	(0.000)	(0.018)	(0.288)	(0.000)		(1.000)	(0.962)	(0.995)
Panel B: Sample 2 (2010Q1–2017Q4)										
Mean	−1.719	5.496	0.811	115.176	0.993	1.526	9.266	484 646	1 916 145	2 400 790
Std. Dev.	1.748	0.626	1.948	5.033	0.044	1.633	2.316	204 160	375 349	573 357
CV	−1.017	0.114	2.403	0.044	0.044	1.071	0.250	0.421	0.196	0.239
JB	1.750	3.058	0.100	4.641	4.182	1.863	2.193	7.614	3.365	4.952
	(0.417)	(0.217)	(0.951)	(0.098)	(0.124)	(0.394)	(0.334)	(0.022)	(0.186)	(0.084)
ADF stat	−2.450	−5.202***	−3.600***	−2.541	−1.986	−3.278***	−1.574	3.194	1.261	1.311
(I(0))	(0.137)	(0.001)	(0.012)	(0.116)	(0.291)	(0.025)	(0.482)	(1.000)	(0.998)	(0.998)

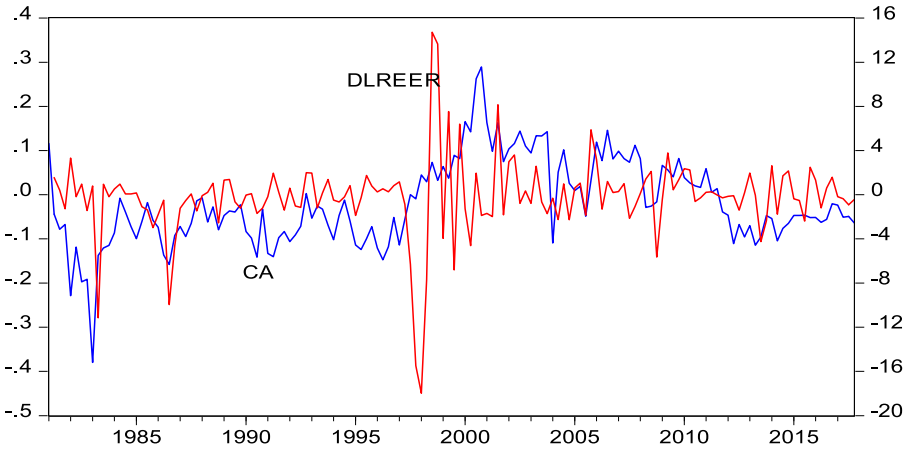

Fig. 4. Current account and *REER*. This figure plots the current account as a percentage of GDP (*CA*) and the logarithm (L) of real effective exchange rate (REER), expressed in their first difference form (*D*) over the quarterly sample period (1981Q1 to 2017Q4).

account balance. Together with *CA*, they are highly volatile. Nonetheless, it is not difficult to see obvious patterns. There seems to be a delay in the movement of *CA* compared to *REER*. We clarify this further in Section C1 with autoregressive distributed lag (ARDL) analysis capturing the lag structure. In contrast, the movements of *CA* and *TOT* follow each other closely at most times, although the effect of *TOT* on *CA* is hardly proportional. The graphs of *RIR* and *CA* reveal an interesting story. It seems that, over most of the earlier years, *CA* was following *RIR* with a lag, until recently, when *CA* seems to be predicting *RIR*'s behaviour. We capture the two samples by estimating the determinants of *CA* using the ARDL model.

The variable *GS*, measured as the government budget deficit as a percentage of the GDP, is not included in sample 1, since the data are unavailable, but it is included in sample 2, valued at (on average) 9.2% of the GDP. Fourth, the total number of visitor arrivals per year averages 1.6 million for sample 1, increasing to 2.4 million for sample 2. Visitors from the top 14 source countries grew from less than 1 million in 1993 to approximately 2.5 million in 2017 while tourists from all the other nations coming to Indonesia rose from nearly 300,000 to 500,000 per year over the corresponding period.

3.2.1. Time series property

Time series unit root tests reflect the persistence of the data. Table 2 reports the results from the augmented Dickey and Fuller (1979) test, over sample 1 (1993Q1–2017Q4) and sample 2 (2010Q1–2017Q4). We also test for structural breaks in the unit root.[2]

[2] The sample size is small; therefore, we do not focus more on structural break unit root tests. We conduct Narayan and Popp's (2010) two endogenous structural break unit root tests. The results are available upon request. We find two statistically significant break dates, but they have

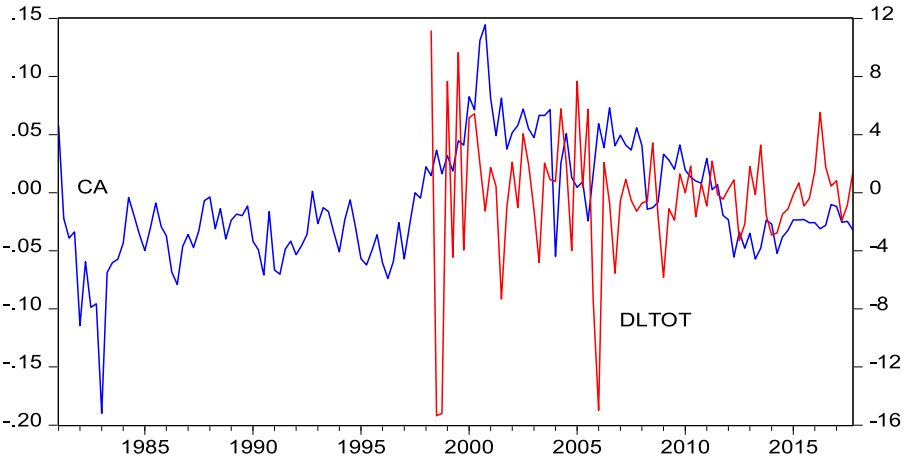

Fig. 5. Current account and terms of trade. This figure plots the current account as a percentage of GDP (*CA*) and the logarithm (L) of terms of trade (*TOT*), expressed in its first difference (*D*) form over the quarterly sample period (1981Q4 to 2017Q4).

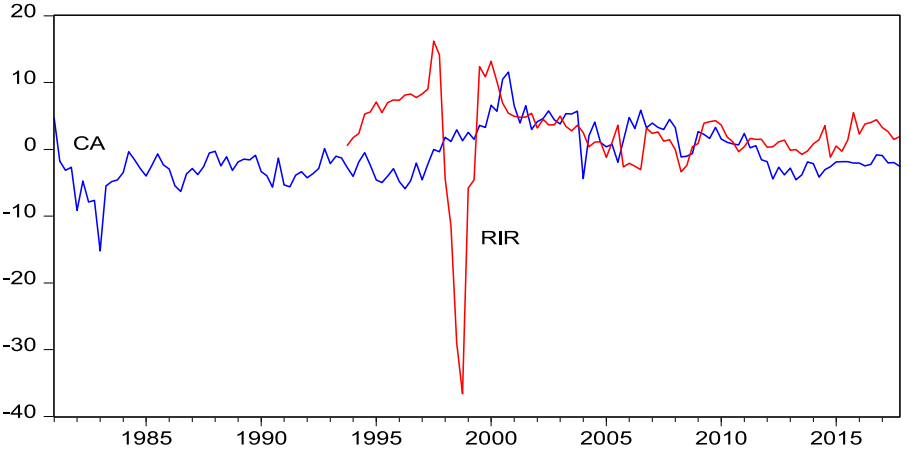

Fig. 6. Current account and real interest rate. This figure plots the current account as a percentage of GDP (*CA*) and Indonesia's real interest rate (*RIR*, year-on-year %) over the quarterly sample period (1981Q1 to 2017Q4).

The variable *CA* reverts to its mean for sample 1, but not for sample 2 . Similar to *CA*, *REER* behaves differently between the two samples, being *I(1)* in sample 1 and *I(0)* in sample 2. Therefore, *REER* is persistent in sample 1, but, in sample 2, shocks to *REER* have only a temporary effect.

Other variables display the same time series properties across samples 1 and 2. In both samples, we find that *TOT* and all the visitor arrivals series, namely, *VAT*, *VATOP*, and *VAO,* are *I(1),* whereas the variables for the growth of *GDP* and *WGDP*, *GS*, and *RIR* are all *I(0)*. All the *I(1)* variables become stationary in their first difference *(D)* form and appear in the regression models in stationary form.

3.3. The current account model

This section presents the results in three parts. The first set relates to the current account models represented by Eqs. (1) to (4) to accommodate visitor arrivals. The second part relates to the results of Eqs. (5) to (7) that augment current account models with tourism (visitor arrival) shocks. The third set of results extracted from Eqs. (8) to (10) test the asymmetry of the effects of tourism shocks on the current account.

3.3.1. The current account, Eqs. (1) to (4)

Eqs. (1) to (4) are estimated using the ARDL model based on ordinary least squares (OLS; for details on the model, see Narayan, 2004b). A maximum of two lags is applied to the dependent and independent variables to capture any

no pattern. We do not explore this further, because it is not the subject of this study. The details of the test can be found in Monte Carlo simulations undertaken by Narayan and Popp (2013).

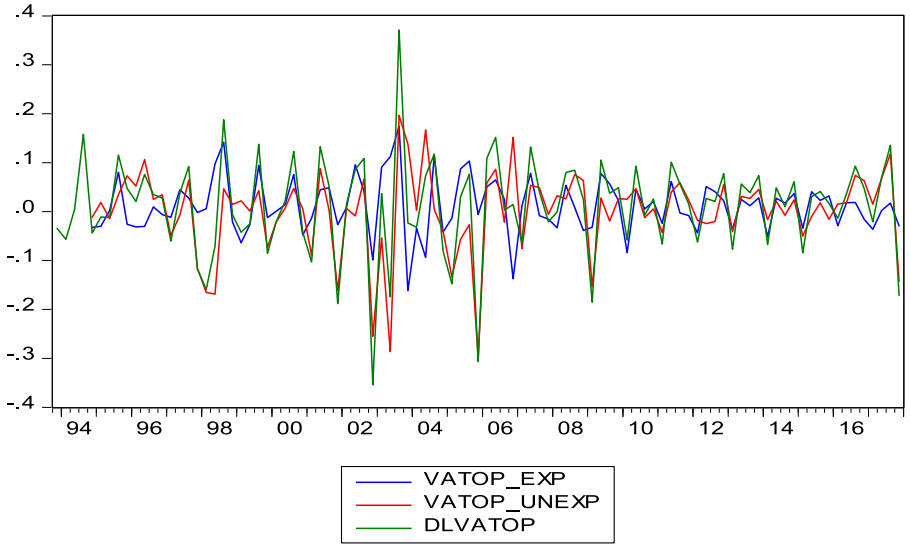

Fig. 7. Expected and unexpected shocks derived from Indonesia's top-14 source markets: 1981Q1:2017Q4. Expected visitor arrivals (tourism) shocks (*EXP*) from Indonesia's top 14 source markets (*VATOP*) are estimated as the fitted values from an AR(1) model of the *VATOP* while the unexpected tourism shocks (*UNEXP*) are the residuals from this AR(1) model. *VATOP* appears in the AR(1) model in log first difference (*D*) form.

dynamic relations. The optimal lag length is chosen by using the Akaike information criteria. Each model uses Newey and West (1987) heteroskedastic and autocorrelation-consistent standard errors and covariance with a Bartlett kernel and a Newey–West fixed bandwidth equal to four.

Model (1) is driven purely by the current account theory discussed in Section 2, whereas Models (2) to (4) are essentially Model (1) augmented with total visitor arrivals (in Model (2)), visitor arrivals from the top 14 source markets (in Model (3)), and visitor arrivals from other source markets (in Model (4)).[3] These models are estimated over two sample periods: from 1993 to 2017 and from 2010 to 2017.

The diagnostics of the ARDL models are presented in Table 3. Panel A covers the models estimated over sample 1, while Panel B reports the diagnostic statistics for the models estimated over sample 2. For all the models in Panels A and B, the joint hypothesis test that the β values are equal to zero is rejected. However, normality, or heteroskedasticity, seems to be a problem in the models in Panel A. For sample 2, on the other hand, neither normality nor the absence of serial correlation or heteroskedasticity can be rejected at the 5% level or better for all the models in question in Panel 2.

The results for Models (1) to (4) are presented in Tables 4 and 5, respectively, for samples 1 and 2. In sample 1 (1993–2017), when the current account is mostly in surplus, on average, *VAT* and the other factors, such as *TOT* and *WGDP*, fail to influence *CA*. The only factors found to be important determinants of *CA* are *REER*, *GDP*, and *RIR*. In other words, in sample 1, we note the prevalence of domestic factors. In sample 2 (2010–2017), the story is different. The current account is in deficit, on average, in sample 2. We find that *VAT*, *TOT*, and *GDPW* are as important as *REER*, *RIR*, and *GDP*.

The above results imply that factors affect *CA* differently depending on whether the current account is in surplus or deficit (the two phases are depicted by the two sample sizes). In other words, these results show the current account responds asymmetrically to shocks when it is in deficit, compared to when it is in surplus. Before we investigate this effect further, we check whether the type of asymmetry we observe from Eqs. (2) to (4) still holds when we consider expected and unexpected visitor arrival shocks to the current account.

3.3.2. The current account, Eqs. (5) to (7)

We estimate Eqs. (6) and (7) using the same procedure as above. The ARDL model is estimated with OLS and includes a maximum of two lags. Fig. 7 displays the first difference of the logarithm of the *VATOP* series (*DVATOP*), the fitted (or expected) series relating to *DVATOP*, and the unfitted (unexpected) series relating to *DVATOP*.

The estimated current account models with expected and unexpected visitor arrival shocks are presented in Tables 6 and 7, respectively. We observe the following. First, tourism shocks are relevant to the current account model. The current account is found to respond to *VAO*. In addition, we find that expected and unexpected shocks of *VATOP* have a positive effect on the current account. Second, when we examine the other income-related factors between samples 1 and 2, we note stronger divergence in the results than noted above (see Tables 6 and 7). For the statistically significant

[3] See also the current account theory reviewed by Narayan (2009).

Table 3
Diagnostics of the ARDL models. This table displays the diagnostic tests relating to the ARDL models. These models are estimated with a maximum of two lags for all variables, except the dependent variable. The variables of interest in each of the models in samples 1 and 2 are as follows: Model (1): $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, LRIR)$; Model (2): $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, LVAT)$; model 3: $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, LVATOP)$; and model 4: $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, LVAO)$. Sample 2 also includes government spending as a percentage of GDP (*GS*). Meanwhile, *CA* is current account as a percentage of GDP; *LREER* is log of real effective exchange rate; *GDP* is Indonesia's GDP growth rate (%); *GDPW* is world GDP growth rate (%); *LTOT* is the log of terms of trade; *RIR* is real annualized inter-bank rate (%); *LVAT* is the logarithm (*L*) of total visitor arrivals (in persons); *LVATOP* is the log of visitor arrivals from 14-top source markets; *LVAO* is the log of visitor arrivals from all other source markets. The *p*-values of the *F*-test and Jarque–Bera (JB) test are stated in parenthesis. BG is the test results from the Breusch–Godfrey serial correlation test and BPG is the heteroskedasticity test results from Breusch–Pagan–Godfrey test. Finally, *, ** and *** denote rejection of the null hypothesis at the 10%, 5%, and 1%, respectively.

	Model 1	Model 2	Model 3	Model 4
Panel A: Sample 1 (1993: Q4 — 2017: Q4)				
	ARDL (2, 1, 2, 0, 0, 2)	ARDL (1, 1, 2, 0, 0, 2, 2)	ARDL (2, 1, 2, 0, 0, 2, 2)	ARDL (2, 1, 2, 0, 0, 2, 0)
F-statistic	14.848***	13.396***	12.620***	13.499***
	(0.000)	(0.000)	(0.000)	(0.000)
JB	76.083***	6.785	15.288***	76.106***
	(0.000)	(0.336)	(0.000)	(0.000)
BG F-statistic	0.766	0.245	0.841	0.756
	(0.469)	(0.783)	(0.436)	(0.474)
BPG F-statistic	0.757	1.904***	2.343***	0.699
	(0.691)	(0.042)	(0.010)	(0.757)
Panel B: Sample 2 (2010: Q1 — 2017: Q4)				
	ARDL (1, 0, 1, 1, 1, 1, 2)	ARDL (1, 2, 0, 1, 1, 0, 2, 2)	ARDL (1, 0, 2, 2, 1, 2, 2, 2)	ARDL (1, 0, 1, 1, 2, 2, 1, 0)
F-statistic	3.177***	6.443***	4.552***	2.559***
	(0.018)	(0.001)	(0.012)	(0.043)
JB	0.017	1.829	0.103	0.001
	(0.991)	(0.401)	(0.950)	(0.999)
BG F-statistic	0.701	3.029*	0.801	1.825
	(0.514)	(0.094)	(0.486)	(0.203)
BPG F-statistic	0.793	0.592	1.364	1.514
	(0.659)	(0.838)	(0.325)	(0.222)

Table 4
Current account model: ARDL method (Sample 1: 1993Q1–2017Q4). These models are estimated using the ARDL framework with a maximum of two lags for all variables, except the dependent variable. The variables of interest in each models are as follows: Model (1): $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR)$; Model (2): $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, LVAT)$; model 3: $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, LVATOP)$; and model 4: $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, LVAO)$. Meanwhile, *CA* is current account as a percentage of GDP; *LREER* is log of real effective exchange rate; *GDP* is Indonesia's GDP growth rate (%); *GDPW* is world GDP growth rate (%); *LTOT* is the log of terms of trade; *RIR* is real annualized inter-bank rate (%); *LVAT* is the log of total visitor arrivals; *LVATOP* is the log of visitor arrivals from 14-top source markets; *LVAO* is the log visitor arrivals from all other source markets. *I(1)* variables, as indicated by the unit root test in Table 2, are in first difference form (*D*). Finally, *, ** and *** denote the level of statistical significance at 10%, 5%, and 1%, respectively.

Variable	Model 1		Model 2		Model 3		Model 4	
	ARDL (2, 1, 2, 0, 0, 2)		ARDL (1, 1, 2, 0, 0, 2, 2)		ARDL (2, 1, 2, 0, 0, 2, 2)		ARDL (2, 1, 2, 0, 0, 2, 0)	
	Coefficient	Probability	Coefficient	Probability	Coefficient	Probability	Coefficient	Probability
CA(−1)	0.450***	0.000	0.564***	0.000	0.472***	0.000	0.450***	0.000
CA(−2)	0.143	0.228	1.257	0.738	0.142	0.264	0.143	0.232
LREER	0.767	0.830	−7.362**	0.028	0.779	0.832	0.762	0.834
LREER(−1)	−6.563*	0.077	0.510**	0.018	−6.150*	0.081	−6.558*	0.084
GDP	0.394*	0.070	−0.278*	0.071	0.409**	0.050	0.394*	0.073
GDP (−1)	−0.168	0.209	−0.171	0.207	−0.203	0.129	−0.168	0.213
GDP (−2)	−0.215*	0.063			−0.190	0.130	−0.215*	0.079
GDPW	−0.026	0.793	−0.051	0.649	−0.051	0.649	−0.026	0.795
DLTOT	−9.480	0.119	−7.357	0.278	−9.366	0.198	−9.491	0.114
RIR	0.107*	0.077	0.114**	0.046	0.126**	0.025	0.107*	0.090
RIR(−1)	−0.125***	0.006	−0.158***	0.007	−0.146***	0.012	−0.125***	0.006
RIR(−2)	0.237***	0.011	0.257***	0.008	0.239***	0.012	0.237***	0.013
DLVAT			−0.875	0.611				
DLVAT(−1)			0.944	0.597				
DLVAT(−2)			−5.231	0.234				
DLVATOP					0.314	0.834		
DLVATOP(−1)					1.301	0.466		
DLVATOP(−2)					−4.436	0.292		
DLVAO							0.007	0.994
C	26.645***	0.012	27.977***	0.008	24.704**	0.016	26.645***	0.012
Adjusted R-squared	0.681		0.690		0.691		0.676	

Table 5
Current account model: ARDL method (Sample 2: 2010Q1–2017Q4). These models are estimated using the ARDL framework with a maximum of two lags for all variables, except the dependent variable. The variables of interest in each models in Sample 2 are as follows: Model (1): $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, GS)$; Model (2): $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, GS, LVAT)$; model 3: $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, GS, LVATOP)$; and model 4: $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, GS, LVAO)$. Meanwhile, *CA* is current account as a percentage of GDP; *LREER* is log of real effective exchange rate; *GDP* is Indonesia's GDP growth rate (%); *GDPW* is world GDP growth rate (%); *LTOT* is the log of terms of trade; *RIR* is real annualized inter-bank rate (%); *GS* is government spending as a percentage of GDP (*GS*). *LVAT* is the log of total visitor arrivals; *LVATOP* is the log of visitor arrivals from 14-top source markets; *LVAO* is the log visitor arrivals from all other source markets. *I(1)* variables, as indicated by the unit root test in Table 2, are in first difference form (*D*). Finally, *, ** and *** denote the level of statistical significance at the 10%, 5%, and 1%, respectively.

Variable	Model 1		Model 2		Model 3		Model 4	
	ARDL (1, 0, 1, 1, 1, 1, 2)		ARDL (1, 2, 0, 1, 1, 0, 2, 2)		ARDL (1, 0, 2, 2, 1, 2, 2, 2)		ARDL (1, 0, 1, 1, 2, 2, 1, 0)	
	Coefficient	Probability	Coefficient	Probability	Coefficient	Probability	Coefficient	Probability
DCA(−1)	−0.445***	0.006	0.094	0.717	−0.255	0.427	−0.307**	0.014
DLREER	11.474*	0.056	6.073*	0.057	14.682***	0.010	11.214*	0.073
DLREER(−1)			9.434*	0.078				
DLREER(−2)			5.516*	0.065				
GDP	−3.246***	0.003	−1.226**	0.024	−3.379**	0.034	−3.453***	0.009
GDP(−1)	1.972**	0.047			0.456	0.850	2.255**	0.036
GDP(−2)					1.357	0.433		
GDPW	0.402***	0.003	0.470***	0.000	0.566***	0.000	0.351***	0.014
GDPW(−1)	−0.192	0.158	−0.120	0.314	−0.235**	0.051	−0.206	0.181
GDPW(−2)					0.093	0.189		
DLTOT	5.275	0.230	−12.777*	0.060	−2.135	0.746	4.213	0.332
DLTOT(−1)	22.093***	0.001	26.953***	0.000	30.230***	0.000	20.877***	0.001
DLTOT(−2)							−4.955	0.685
RIR	−0.212	0.114	−0.319***	0.005	−0.369***	0.001	−0.187**	0.055
RIR(−1)	−0.213	0.101			−0.050	0.729	−0.281**	0.055
RIR(−2)					0.217**	0.012	0.155	0.283
DGS	0.177**	0.035	0.146	0.025	0.294***	0.007	0.165	0.133
DGS(−1)	0.361***	0.000	0.466***	0.001	0.595***	0.004	0.290***	0.001
DGS(−2)	0.117	0.240	0.255	0.027	0.308**	0.039		
DLVAT			−7.000***	0.007				
DLVAT(−1)			0.643	0.912				
DLVAT(−2)			−23.818***	0.000				
DLVATOP					−6.438*	0.099		
DLVATOP(−1)					−11.616*	0.072		
DLVATOP(−2)					−22.985***	0.001		
DLVAO							−2.575	0.264
C	7.138***	0.010	7.525**	0.017	9.081**	0.010	6.690***	0.009
Adjusted R-squared	0.503		0.757		0.707		0.446	

variables (*REER*, *GDP*, and *TOT*), the sign effects differ between the samples. Second, concerning visitor arrivals, in sample 1, unexpected *VAT* shocks with lags of two quarters have a negative effect on *CA*, but, in sample 2, both expected and unexpected shocks from *VATOP,* and *VAO* are shown to have a positive effect.

Overall, it seems there is some asymmetry in the case of *VA*, *REER*, *GDP*, and *TOT*. This implies potential asymmetric behaviour in the response of the current account, particularly in periods when it is in surplus (captured mainly by sample 1) or in deficit (captured by sample 2). We test this next.

3.3.3. Asymmetric effect of tourism shocks on the current account

To test the asymmetric behaviour of the current account, we estimate the following equations for sample 1:

$$CA_t = \alpha_1 + \beta_{81}(X_t * CAS_t) + \beta_{82}(X_t * CAD_t) + \varepsilon_{8t} \tag{8}$$

$$CA_t = \alpha_1 + \beta_{91}(X_t * CAS_t) + \beta_{92}(VAT\_EXP_t * CAS_t) + \beta_{93}(VAT\_UNEXP_t * CAS_t) + \beta_{94}(X_t * CAD_t) + \beta_{95}(VAT\_EXP_t * CAD_t) + \beta_{96}(VAT\_UNEXP_t * CAD_t) + \varepsilon_{9t} \tag{9}$$

$$CA_t = \alpha_1 + \beta_{101}X_t + \beta_{102}(VATOP\_EXP_t * CAS_t) + \beta_{103}(VATOP\_UNEXP_t * CAS_t) + \beta_{104}(VATOP\_EXP_t * CAD_t) + \beta_{105}(VATOP\_UNEXP_t * CAD_t) + \varepsilon_{9t} \tag{10}$$

where each of the current account determinants is conditioned on periods of current account surplus (*CAS*) and current account deficit (*CAD*), *CAS* is a binary variable with a value of one in periods of current account surplus, and *CAD* is the current account deficit expressed as 1 - *CAS*. Eq. (8) is estimated by excluding visitor arrival shocks. Eq. (9) is estimated by including expected and unexpected shocks from *VAT*, *VATOP*, and *VAO*. Eq. (10) is estimated with visitor arrival shocks being the only source of current account asymmetry. The asymmetry hypothesis is tested using OLS regression with Newey and West (1987) heteroskedastic and autocorrelation-consistent standard errors and covariance. The results corresponding to Eqs. (8) and (9) are reported in Table 8 and the results from Eq. (10) are presented in Table 9.

Table 6
Expected and unexpected visitor arrival shocks and the current account, Sample 1 (1993Q1–2017Q4). These models are estimated using the ARDL framework with a maximum of two lags and a minimum of 0 (1) lags for the independent (dependent) variables The variables of interest in each models are as follows: Model (5): $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, VAT\_EXP, VAT\_UNEXP)$; model 3: $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, VATOP\_EXP, VATOP\_UNEXP)$; and model 4: $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, VAO\_EXP, VAO\_UNEXP)$. *CA* is current account as a percentage of GDP; *LREER* is log of real effective exchange rate; *GDP* is Indonesia's GDP growth rate (%); *GDPW* is world GDP growth rate (%); *LTOT* is the log of terms of trade; *RIR* is real annualized inter-bank rate (%); *VAT_EXP* and *VAT_UNEXP* are expected and unexpected shocks relating to total visitor arrivals; *VATOP_EXP* and *VATOP_UNEXP* are expected and unexpected shocks relating to visitor arrivals from 14-top source markets; *VAO_EXP* and *VAO_UNEXP* are expected and unexpected visitor arrival shocks from all other source markets. *I(1)* variables, as indicated by the unit root test in Table 2, are in first difference form (*D*). Finally, *, ** and *** denote the level of statistical significance at 10%, 5%, and 1%, respectively.

Variable	Model 5		Model 6		Model 7	
	Coefficient	Probability	Coefficient	Probability	Coefficient	Probability
CA(−1)	0.414***	0.001	0.439***	0.000	0.534**	0.000
CA(−2)	0.184*	0.094	0.204*	0.083		
LREER	−4.028*	0.060	−3.946*	0.092	1.126	0.763
LREER(−1)					−7.561**	0.028
GDP	0.486**	0.022	0.347*	0.095	0.488**	0.026
GDP(−1)	−0.309**	0.030	−0.180	0.196	−0.238*	0.098
GDP(−2)	−0.217	0.111	−0.246*	0.079	−0.204	0.102
GDPW	−0.070	0.476	−0.055	0.563	−0.036	0.737
DLTOT	−11.705**	0.018	−11.907**	0.024	−7.718	0.201
RIR	0.076	0.171	0.086	0.126	0.088	0.187
RIR(−1)	−0.082**	0.028	−0.069*	0.079	−0.126***	0.002
RIR(−2)	0.241***	0.009	0.206**	0.023	0.263***	0.010
VAT_EXP	1.733	0.564				
VAT_EXP(−1)	4.908	0.205				
VAT_UNEXP	−1.665	0.419				
VAT_UNEXP(−1)	−1.859	0.527				
VAT_UNEXP(−2)	−7.495**	0.036				
VATOP_EXP			4.099	0.185		
VATOP_EXP(−1)			8.992	0.170		
VATOP_UNEXP			−0.073	0.967		
VAO_EXP					3.294	0.268
VAO_UNEXP					−1.084	0.572
C	18.715*	0.052	18.398*	0.079	29.462***	0.003
Adjusted R-squared	0.704		0.688		0.678	
F-statistic	12.596		13.280		13.615	
Probability (F-statistic)	0.000		0.000		0.000	

We find the following key results and patterns. Tourism, as an income shock, contributes to the asymmetric response of current account. Expected and unexpected shocks to visitor arrivals matter to the current account. However, asymmetric responses of the current account are found only in the case of an expected visitor arrival shock. An expected visitor arrival shock has a negative effect when the current account is in deficit, and a positive effect when it is in surplus. These relations hold for visitor arrival shocks deriving from *VATOP*, but not from *VAO*. Unexpected visitor arrival shocks (only shocks from *VATOP*) are positively related to the current account, regardless of whether it is in surplus or deficit.

4. Concluding remarks

This paper is motivated by the growing current account imbalance in Indonesia, with a focus on tourism as a partial solution to fixing it. We show that tourism is important to Indonesia's current account prospects. Just as the literature has documented that tourism influences economic growth, exchange rates, and international trade, we show that expected and unexpected positive tourism shocks positively contribute to the current account balance in Indonesia. An important insight from our analysis is that the current account responds asymmetrically to tourism shocks. The evidence points to expected tourism shocks worsening the current account when it is already in deficit and improving it when it is in surplus. We conclude by showing that unexpected positive tourism shocks improve the account balance, regardless of whether the account is in deficit or surplus.

These results allow us to provide multiple policy directions. First, since positive tourism shocks tend to improve the current account balance, negative tourism shocks will worsen the balance. Therefore, negative shocks (particularly expected ones, e.g., those related to tourism industry policy) must be mitigated to avoid current account pressures. Second, unexpected negative shocks, such as the current outbreak of coronavirus or terrorism-related activities that directly hurt the tourism industry, will worsen the current account balance, which is unavoidable. However, their repercussions on the industry can be minimized through government responses and/or policies.

There are important directions for future research, inspired in large part by the current COVID-19 pandemic. This literature shows how Asian markets are impacted by the pandemic; see Tisdell (2020), Narayan et al. (2020), C.T. and

Table 7
Expected and unexpected visitor arrival shocks and the current account: Sample 2 (2010Q1–2017Q4). These models are estimated using the ARDL framework with a maximum of one lag and a minimum of 0 (1) lags for the independent (dependent) variables The variables of interest in each models are as follows: Model (5): $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, VAT\_EXP, VAT\_UNEXP)$; model 3: $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, VATOP\_EXP, VATOP\_UNEXP)$; and model 4: $CA = f(CA, LREER, GDP, GDPW, GDPW, LTOT, RIR, VAO\_EXP, VAO\_UNEXP)$. Meanwhile, *CA* is current account as a percentage of GDP; *LREER* is log of real effective exchange rate; *GDP* is Indonesia's GDP growth rate (%); *GDPW* is world GDP growth rate (%); *LTOT* is the log of terms of trade; *RIR* is real annualized inter-bank rate (%); *VAT_EXP* and *VAT_UNEXP* are expected and unexpected shocks relating to total visitor arrivals; *VATOP_EXP* and *VATOP_UNEXP* are expected and unexpected shocks relating to visitor arrivals from 14-top source markets; *VAO_EXP* and *VAO_UNEXP* are expected and unexpected visitor arrival shocks from all other source markets. *I(1)* variables, as indicated by the unit root test in Table 2, are in first difference form (*D*). Finally, *, ** and *** denote the level of statistical significance at 10%, 5%, and 1%, respectively.

Variable	Model 5		Model 6		Model 7	
	ARDL (1,1,0,1,1,0,1,0)		ARDL (1,0,1,1,10,1,1)		ARDL (1,1,1,1,1,0,1,1)	
	Coefficient	Probability	Coefficient	Probability	Coefficient	Probability
DCA(−1)	−0.448**	0.017	−0.279**	0.028	−0.626***	0.000
DLREER	11.000**	0.022	12.960***	0.009	8.118	0.253
DLREER(−1)	−5.810	0.216			−9.014*	0.067
GDP	−1.287**	0.004	−1.947**	0.020	−3.482*	0.077
GDP(−1)			0.959	0.163	2.413	0.151
GDPW	0.254**	0.011	0.302**	0.016	0.215	0.226
GDPW(−1)	−0.310**	0.002	−0.419***	0.010	−0.142	0.183
DLTOT	4.413	0.453	0.062	0.986	1.628	0.776
DLTOT(−1)	11.077*	0.053	20.732***	0.007	17.540**	0.030
RIR_Y	−0.255**	0.039	−0.314**	0.016	−0.154	0.369
VAT_EXP	1.014	0.766				
VAT_EXP(−1)	17.728***	0.000				
VAT_UNEXP	1.558	0.706				
VATOP_EXP			11.688**	0.016		
VATOP_EXP(−1)			22.603***	0.000		
VATOP_UNEXP			−0.295	0.910		
VATOP_UNEXP(−1)			18.324**	0.016		
VAO_EXP					−20.872***	0.010
VAO_EXP(−1)					11.611**	0.042
VAO_UNEXP					−0.946	0.644
VAO_UNEXP(−1)					−6.688**	0.049
C	6.597***	0.007	4.894**	0.023	5.991*	0.089
Adjusted R-squared	0.657		0.752		0.258	
F-statistic	4.999		7.066		1.669	
Probability (*F*-statistic)	0.004		0.001		0.182	

Prabheesh (2020), Fu and Shen (2020), Gu et al. (2020), Narayan (2020a,b), Narayan et al. (2020), Wang et al. (2020), Yue et al. (2020), He et al. (2020b,a), Sha and Sharma (2020), Sharma (2020), Salisu and Sikiru (2020), Gil-Alana and Claudio-Quiroga (2020), Prabheesh (2020); among others. What this literature does not consider is the effects of COVID-19 on the tourism industry (visitor arrivals) and what ramifications this is going to have on the current account in years to come. There is a need for impact assessment and forecasting — both have implication for the revival of the tourism industry globally.

Declaration of competing interest

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

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Table 8
The asymmetric behaviour of Indonesia's current account: Sample 1 (1993Q1–2017Q4). These models are estimated using OLS regression method with Newey and West (1987) heteroskedastic and autocorrelation consistent standard errors and covariance. *CA, GDP, GDPW* and *RIR* are expressed in percentage (%) and the rest of the variables (*REER, TOT, VAO, VATOP* and *VAT*) are in their logarithmic form. *I(1)* variables, as indicated by the unit root test in Table 2, are in first difference form (*D*). Finally, *, ** and *** denote the level of statistical significance at 10%, 5%, and 1%, respectively.

Variable	Model 8		Model 9a		Model 9b		Model 9c	
	Coefficient	Probability	Coefficient.	Probability	Coefficient	Probability	Coefficient	Probability
C	23.483	0.122	27.129*	0.075	26.635*	0.082	23.650	0.136
REER×CAD	−5.591*	0.085	−6.888**	0.036	−6.669**	0.043	−5.657*	0.092
GDP×CAD	0.085	0.882	0.527	0.370	0.437	0.498	0.118	0.836
GDPW×CAD	−0.120	0.104	−0.037	0.701	−0.090	0.407	−0.116	0.147
DLTOT×CAD	0.106	0.988	3.423	0.500	2.064	0.725	0.991	0.889
RIR×CAD	0.035	0.803	0.034	0.796	0.066	0.656	0.028	0.849
LREER×CAS	−4.465	0.191	−5.284	0.121	−5.163	0.133	−4.502×	0.205
GDP×CAS	−0.016	0.928	0.000	0.999	−0.004	0.981	−0.034	0.854
GDPW×CAS	−0.009	0.947	−0.012	0.929	−0.021	0.881	0.005	0.969
DLTOT×CAS	−12.105***	0.013	−13.969***	0.006	−13.357***	0.006	−13.887***	0.006
RIR×CAS	0.185*	0.038	0.191**	0.041	0.189**	0.033	0.201**	0.043
VAT_EXP×CAD			−15.462***	0.004				
VAT_UNEXP×CAD			8.940***	0.009				
VAT_EXP×CAS			2.293	0.481				
VAT_UNEXP×CAS			4.743	0.153				
VATOP_EXP×CAD					−12.647*	0.096		
VATOP_UNEXP×CAD					6.042*	0.061		
VATOP_EXP×CAS					0.729	0.827		
VATOP_UNEXP×CAS					4.681*	0.085		
VAO_EXP×CAD							−1.927	0.611
VAO_UNEXP×CAD							−0.652	0.662
VAO_EXP×CAS							1.466	0.741
VAO_UNEXP×CAS							1.872	0.385
Adjusted R-squared	0.726		0.734		0.730		0.715	
F-statistic	21.648		16.377		16.081		14.991	
Probability (*F*-statistic)	0.000		0.000		0.000		0.000	

Table 9
Tourism the source of asymmetry in CA: Sample 1 (1993Q1–2017Q4). These models are estimated using OLS regression method with Newey and West (1987) heteroskedastic and autocorrelation consistent standard errors and covariance. *CA, GDP, GDPW* and *RIR* are expressed in percentage (%) and the rest of the variables (*REER, TOT, VAO, VATOP* and *VAT*) are in their logarithmic form. *I(1)* variables, as indicated by the unit root test in Table 2, are in first difference form (*D*). Finally, *, ** and *** denote the level of statistical significance at 10%, 5%, and 1%, respectively.

Variable	Coefficient	Probability	Coefficient	Probability	Coefficient	Probability
C	66.643***	0.000	64.511***	0.000	60.489***	0.000
LREER	−14.571***	0.000	−14.087***	0.000	−13.153***	0.000
GDP	0.225	0.218	0.207	0.228	0.138	0.441
GDP	0.322***	0.003	0.306***	0.008	0.287***	0.003
DLTOT	−19.128***	0.000	−18.840***	0.002	−20.246***	0.001
RIR	0.150*	0.079	0.156*	0.062	0.190**	0.036
*VAT_EXP*CAS*	3.725	0.381				
*VAT_EXP*CAD*	−26.905***	0.001				
*VAT_UNEXP*CAS*	5.337	0.201				
*VAT_UNEXP*CAD*	−2.902	0.685				
*VATOP_EXP*CAS*			1.606	0.762		
*VATOP_EXP*CAD*			−27.328*	0.067		
*VATOP_UNEXP*CAD*			0.916	0.407		
*VATOP_UNEXP*CAD*			−1.583	0.862		
*VAO_EXP*CAS*					4.128	0.451
*VAO_EXP*CAD*					0.002	1.000
*VAO_UNEXP*CAS*					2.047	0.476
*VAO_UNEXP*CAD*					−6.822*	0.071
Adjusted R-squared	0.451		0.436		0.430	
F− statistic	8.132		7.693		7.541	
Probability (*F*-statistic)	0.000		0.000		0.000	

References

Ahmed, S., Park, H.J., 1994. Sources of macroeconomic fluctuations in small open economies. J. Macroecon. 16, 1–36.
Aratuo, D.N., Etienne, X.L., 2019. Industry level analysis of tourism-economic growth in the US. Tour. Manag. 70, 333–340.
Cashin, P., Mcdermott, C.J., 2002. Terms of trade shocks and the current account: Evidence from five industrial countries. Open Econ. Rev. 13 (3), 219–235.
Cheng, K., Kim, H., Thompson, H., 2013. The exchange rate and US tourism trade. Tour. Econ. 19, 883–896.

Chinn, M.D., Prasad, E.S., 2003. Medium-term determinants of current accounts in industrial and developing countries: an empirical exploration. J. Int. Econ. 59, 47–76.
C.T., Vidya, Prabheesh, K.P., 2020. Implications of COVID-19 pandemic on the global trade networks. Emerg. Mark. Financ. Trade 56 (10), 2408–2421. http://dx.doi.org/10.1080/1540496X.2020.1785426.
Dibooglu, S., 1997. Accounting for US current account deficit: an empirical investigation. Appl. Econ. 29 (6), 787–793.
Dickey, D.A., Fuller, W.A., 1979. Distribution of the estimates for autoregressive time series with a unit root. J. Am. Stat. Assoc. 74, 427–431. http://dx.doi.org/10.2307/2286348.
Dornbusch, R., 1976. Expectations and exchange rate dynamics. J. Polit. Econ. 84 (6), 1161–1176.
Fonseca, N., Sanchez-Rivero, M., 2020. Significance bias in the tourism-led growth literature. Tour. Econ. 26, 137–154.
Fu, M., Shen, H., 2020. COVID-19 and corporate performance in the energy industry. Energy Res. Lett. 1 (1), 12967. http://dx.doi.org/10.46557/001c.12967.
Gil-Alana, L.A., Claudio-Quiroga, G., 2020. The COVID-19 IMPACT on the ASIAN stock MARKETS. Asian Econ. Lett. 1 (2), http://dx.doi.org/10.46557/001c.17656.
Greenwood, J., 1983. Expectations, the exchange rate and the current account. J. Monetary Econ. 12, 543–569.
Gu, X., Ying, S., Zhang, W., Tao, Y., 2020. How do firms respond to COVID-19? First evidence from suzhou, China. Emerg. Mark. Financ. Trade 56 (10), 2181–2197. http://dx.doi.org/10.1080/1540496X.2020.1789455.
He, P., Niu, H., Sun, Z., Li, T., 2020a. Accounting index of COVID-19 impact on chinese industries: A case study using big data portrait analysis. Emerg. Mark. Financ. Trade 56 (10), 2332–2349. http://dx.doi.org/10.1080/1540496X.2020.1785866.
He, P., Sun, Y., Zhang, Y., Li, T., 2020b. COVID-19's impact on stock prices across different sectors—An event study based on the chinese stock market. Emerg. Mark. Financ. Trade 56 (10), 2198–2212. http://dx.doi.org/10.1080/1540496X.2020.1785865.
Hossain, F., 1999. Transitory and permanent disturbances and the current account: An empirical analysis in the intertemporal framework. Appl. Econ. 31 (8), 965–974.
Katircioglu, S.T., 2009. Revisiting the tourism-led-growth hypothesis for Turkey using the bounds test and johansen approach for cointegration. Tour. Manag. 30, 17–20.
Kaufmann, S., Scharler, J., Winckler, G., 2002. The Austrian current account deficit: driven by twin deficits or by intertemporal expenditure allocation?. Empirical Economics 27, 529–542.
Kent, C., Cashin, P., 2003. The Response of the Current Account To Terms of Trade Shocks: Persistence Matters. IMF Working Paper, WP/03/143.
Kulendran, N., Wilson, K., 2000. Is there a relationship between international trade and international travel?. Appl. Econ. 32, 1001–1009.
Laursen, S., Metzler, L.A., 1950. Flexible exchange rates and the theory of employment. Rev. Econ. Stat. 32, 281–299.
Narayan, P.K., 2004b. Fiji's tourism demand: the ARDL approach to cointegration. Tour. Econ. 10, 193–206.
Narayan, S., 2009. A survey on dynamics of current account imbalances. Indian Econ. J. 57 (3), 3–26.
Narayan, P.K., 2020a. Has COVID-19 changed exchange rate resistance to shocks?. Asian Econ. Lett. 1 (1), http://dx.doi.org/10.46557/001c.17389.
Narayan, P.K., 2020b. Did bubble activity intensify during COVID-19?. Asian Econ. Lett. 1 (2), http://dx.doi.org/10.46557/001c.17654.
Narayan, P.K., Devpura, N., Wang, H., 2020. JapanEse currency and stock market—What happened during the COVID-19 pandemic?. Econ. Anal. Policy 68, 191–198.
Narayan, P.K., Popp, S., 2010. A new unit root test with two structural breaks in level and slope at unknown time. J. Appl. Stat. 37, 1425–1438.
Narayan, P.K., Popp, S., 2013. Size and power properties of structural break unit root tests. Appl. Econ. 45, 721–728.
Newey, W.K., West, K.D., 1987. A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. Econometrica 55, 703–708.
Obstfeld, M., 1982. Aggregate spending and terms of trade: Is there a laursen- metzler effect?. Q. J. Econ. 97 (2), 251–270.
Persson, T., Svensson, L.E.O., 1985. Current account dynamics and the terms of trade: Harberger-laursen-metzler two generations later. J. Polit. Econ. 93 (1), 43–65.
Pitchford, J.D., 1989. Optimum borrowing and current account when there are fluctuations in income?. J. Int. Econ..
Prabheesh, K.P., 2020. Dynamics of foreign portfolio investment and stock market returns during the COVID-19 pandemic: Evidence from India. Asian Econ. Lett. 1 (2), http://dx.doi.org/10.46557/001c.17658.
Rodriguez, C.A., 1980. The role of trade flows in exchange rate determination: A rational expectation approach. J. Polit. Econ. 88 (6), 1148–1158.
Salisu, A.A., Sikiru, A.A., 2020. Pandemics and the Asia-Pacific islamic stocks. Asian Econ. Lett. 1 (1), http://dx.doi.org/10.46557/001c.17413.
Santana-Gallego, M., Ledesma-Rodrıǵuez, F., Pe´rez-Rodrı´guez, J.V., 2011. Tourism and trade in OECD countries. a dynamic heterogeneous panel data analysis. Empir. Econ. 41, 533.
Sha, Y., Sharma, S.S., 2020. Res. Pandemics Spec. Issue J. Emerg. Mark. Financ. Trade 56, 2133–2137. http://dx.doi.org/10.1080/1540496X.2020.1795467.
Shan, J., Wilson, K., 2001. Causality between trade and tourism: empirical evidence from China. Appl. Econ. Lett. 8, 279–283.
Sharma, S.S., 2020. A note on the Asian market volatility during the COVID-19 pandemic. Asian Econ. Lett. 1 (2), http://dx.doi.org/10.46557/001c.17661.
Svennson, L., Razin, A., 1983. The terms of trade and the current account: The harberger- laursen- metzler effect. J. Polit. Econ. 91 (1), 97–125.
Thompson, A., Thompson, H., 2010. The exchange rate, euro switch and tourism revenue in Greece. Tour. Econ. 16, 773–780.
Tisdell, C.A., 2020. Economic, social and political issues raised by the COVID-19 pandemic. Econ. Anal. Policy 68, 17–28.
Wang, Y., Zhang, D., Wang, X., Fu, Q., 2020. How does COVID-19 affect China's insurance market?. Emerg. Mark. Financ. Trade http://dx.doi.org/10.1080/1540496X.2020.1791074.
Yue, P., Korkmaz, A.G., Zhou, H., 2020. Household financial decision making amidst the COVID-19 pandemic. Emerg. Mark. Financ. Trade 56 (10), 2363–2377. http://dx.doi.org/10.1080/1540496X.2020.1787149.