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The economic impact of terrorism in Indonesia

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Abstract

This paper examines the impact of five recent terrorist attacks on risk and returns for 16 industry portfolios on the Indonesian stock exchange. We report significant loss of wealth in certain sectors after the domestic attacks in Bali and around the September 11 attacks. These two attacks did not have any immediate change in systematic risks but influenced the market risk of some sectors in the long term. The foreign terrorist attacks, in Madrid, London and Mumbai, had a minimal impact, in terms of wealth destruction and changes in systematic risk on the Indonesian industrial portfolios studied. In short, this study demonstrate that the losses associated with acts of terrorism is beyond what is reported in the media and thus justify the actions of policy makers in fighting terrorism.
I. Introduction

Terrorist events dismay the world and, generally, increase anxiety about future economic well-being as the economic ramifications of such attacks can be felt beyond the borders of the country under attack. Lee, Enders, and Sandler (2009) define terrorism as the thought-out use or threat of use of violence by individuals or sub-national groups to obtain a political or social objective through the intimidation of a large audience, beyond the immediate victims.¹ The main intent of terrorist acts, therefore, is to impose sufficient political and economic costs on a government to elicit a concession to the political demands of the terrorists.

Enders and Sandler (1996) note the possible sources of terrorist-imposed economic costs on an economy. First, losses from tourist revenues could eventuate if tourists respond to the risk of terrorist attacks by spending their vacation in a safer country. Also, a country’s future stock of capital may be reduced through smaller inflows of investment from abroad. Furthermore, the destruction of infrastructure as a result of terrorism causes economic disruption. Moreover, resources used to deter terrorist attacks and/or to capture terrorists represent opportunity costs. In line with this thinking, terrorism is seen by many government officials, academics, as well as the private sector as a primary threat to Indonesia’s stability and continued economic growth and development. Terrorism in Indonesia has resulted in attacks against the Australian Embassy in Jakarta, Jakarta Stock Exchange, the JW Marriott in Jakarta, and several tourist haunts on the resort island of Bali. Jemaah Islamiah and other terrorist groups have talked about their dream of bringing about financial ruin through

¹ See Levine and Smith (1997), Garcia-Alonzo (1999) and Golde and Tishler (2004) for a comprehensive review and analyses of arms races.
their attacks on economic targets and damaging markets. The consequences of their terrorist attacks include volatile trading on the Indonesia Stock Exchange as investors, both domestic and foreign, assess the implication on their wealth. In 2002, the government of Indonesia acknowledged the threat of terrorism on the Muslim-dominated archipelago and successive Indonesian governments have since devoted resources to fighting terrorism and consented to extraordinary cooperation between Indonesian police and intelligence agencies and their foreign counterparts. The government actions have led to the prosecution and conviction of many terrorists, the numbers in excess of what any other national government has achieved. The relentless pursuit of the Bali bombers by the Indonesian government and the recent elimination of the Malaysian-born Noordin Mohammad Top, who set up a violent splinter group of regional militant network Jemaah Islamiah, by the Indonesian security forces, is further evidence that the Indonesian government understands the significant economic costs of terrorism to the domestic economy. Given that the expected costs associated with a terrorist campaign exceeds the expected costs associated with making concessions to the terrorist, it is understandable that the Indonesian government is allocating resources towards nullifying the threat.

Some have suggested that ordinary Indonesians are more concerned about daily issues such as having enough housing, water, and electricity, rooting out corruption and improving infrastructure development. This pattern of thought leaves out the bigger picture of threat to safeguarding the national interest and improving security and stability that are needed to improve the livelihood of the general populace. The fears of the business community, both local and international, can derail national

http://www.abc.net.au/7.30/content/2002/s702462.htm;
development policies as a fair degree of certainty and continuity is necessary condition for wealth creation. The negative influence of terrorism on an economy is, on many occasions, widely reported but seldom quantified. The benefit of quantification for policy makers include proper response because of the likelihood of a better plan for prevention and knowledge of which industry will suffer most, jobs, income, and tax revenue to be lost. Policy makers would also have a very good estimate of how much budget can be justified for preventive measures. In this paper, we aim to quantify the influence of terrorism by focusing on the economic costs associated with terrorist campaigns and examining the sectoral as well as general impact of terrorist acts on the Indonesian economy. Although the considerations discussed in this paper are economic, we, however, recognise that the threat posed by terrorism is multifaceted.

We investigate whether five recent terrorist campaigns had measurable and significant effects on the Indonesian economy. An important distinction is made between domestic and transnational terrorism. Domestic terrorism begins and ends in the host country. For example, the Bali bombing was an act of domestic terrorism. However, when a terrorist incident in one country includes victims, or targets, or institutions, or citizens of another country, terrorism assumes a transnational character.\(^3\) Thus, the impact of September 11 terrorist attacks in the US on Indonesia is of a transnational nature. We examine the impact of both types of terrorism on the Indonesian economy. In any investment decision, a potential investor, as well as existing investors, is concerned about the expected return and risk associated with a contemplated investment relative to other opportunities at home and abroad. Security

markets reflect the strengths and weaknesses of an economy. Variables that determine value for the security market are heavily linked to macroeconomic variables like gross domestic product (GDP). For example, Levine and Zervos (1996) find a positive and significant correlation between stock market development and economic growth. As such, it is reasonable to use the securities market as a laboratory to examine changes and expectation in the domestic economy resulting from terrorism. We, therefore, examine the return characteristics of 16 Indonesian industrial sectors to understand the economic impact of terrorism in Indonesia. We investigate the possible wealth effects resulting from terrorism. Further, terrorist threat in economics and finance, potentially, translates into systematic or market risk. As such, this paper also investigates how domestic and transnational terrorism changes level of systematic risk in Indonesia. We also ascertain whether or not terrorist attacks have increased perceived risk in Indonesia.

For governments, it is crucial to understand the magnitude of the effects of terrorism as monetary and fiscal policymakers may have to react to broad-based terrorist attacks. Importantly, the significant and negative wealth effects documented in our empirical analyses suggest that investors factor terrorist risk into their business evaluations. Such risk factor, invariably, increases the cost of borrowing. Monetary and fiscal policymakers must, therefore, be aware of this change in the business environment.

II. Economic and Financial Market Impacts of Terrorism

4 The sectors investigated are automobile, banking, consumer durables and apparel, consumer staples, diversified financials, energy, general retailer, healthcare, industrials, information technology, insurance, materials, media, real estate, telecommunications, and utility.
In alignment to Enders and Sandler (1996) work on the sources of terrorist imposed economic cost, Johnston and Nedelescu (2005) break down the economic impact of terrorism into three effects: short-term direct effects, medium-term confidence effects and longer term productivity effects. The short term direct economic costs are most prominent in the immediate aftermath of terrorist attacks and include the obliteration of life and property, responses to the emergency, restoration of disrupted services and the infrastructure affected, and the provision of temporary living assistance. These costs are likely to be proportionate to the intensity of the attacks and the size and the characteristics of the economy affected.

The indirect costs of terrorism also have the potential to affect the economies in the medium term by undermining consumer and investor confidence. A corrosion of confidence associated with terrorist attacks could reduce the incentive to spend as opposed to save, a process that can spread through the economy and the rest of the world through normal business cycle and trade channels. Analogously, falling investor confidence may trigger a generalised drop in asset prices and a flight to quality that increases the borrowing costs for riskier borrowers (IMF, 2001). The size and distribution of the effects over countries, sectors, and time depend on a variety of factors, including the nature of the attacks, the multiplier effects and the resilience of the markets (Bruck and Wickstrom, 2004). Over the longer term, terrorist attacks can have a negative impact on productivity by raising the costs of transactions through increased security measures, higher insurance premiums, and the increased costs of financial and other counterterrorism regulations.

The impact of terrorist attacks on financial markets is, intuitively, predictable in that they are likely to lead to increases in investors’ risk aversion. This market reaction is
consistent with the expected economic impact of terrorism in the intermediate and
longer term by depressing confidence and increasing the risk aversion of consumers
and firms, by worsening consumption and real investment activity, by setting off
economic slowdown, and by spilling over to other security markets. Further, there is
the possible impact of psychological fear of terrorism on economic behaviour.

Given that security prices reflect market participants’ expectations about the future,
the aggregated price movements can engender a tidal wave of activity to reflect
heightened anxiety about the future following such traumatic terrorist events. Terrorist
attacks can have serious implications for the stock market. Decisions relating to
buying and selling can quickly, easily, and inexpensively, be reversed. The high
speed at which information is transmitted means that knowledge of uncertainty in the
financial markets can induce decisions rapidly, worsening contagion and spreading
investor panic. As information flows to investors about specific terrorist events, they
make assessments about firms’ ability to cope with potential political, societal, and
economic changes, discounting the value of current and future performance (Chen
and Siems 2004). Since stock market and industrial indices are representative of all
individual equity portfolios, a market’s positive or negative movement is characteristic
of the aggregate portfolios within that market.

Chen and Siems (2004) also note that a terrorist attack, with the intent to inflict
enough political and economic costs on governments, often leads to investors fleeing
the market in search of safer financial instruments and panic offloading of financial
assets ensues. This may be because of an increase in perceived risks. In line with the
medium and long term economic impact of terrorism, there is the possibility that the
initial reaction would turn into bedlam and a long-term bear market. This point is
amplified by Fisher (2001) who suggests that terrorist events may have long lasting influences on investor and consumer confidence. This increase in systematic risk can be referred to as terrorist risk. Analogous to other macroeconomic factors, this contemporary risk factor should not be neglected during this current war on terrorism. It, thus, seems logical to investigate the response of capital markets to terrorist attacks.

We contribute to the understanding of the economic impact of terrorism by examining whether five recent terrorist attacks are associated with significant negative wealth changes on the Indonesian capital market, given the destruction tendency of terrorism, and, if so, how large are these changes. Previous studies in this area have differed in terms of types of terrorist attacks considered as well as the target of the attacks. One strand of the literature has examined the impact of September 11 terrorist attacks on the behaviour of the US financial markets. For example, Carter and Simkins (2004) look into the impact of US airline stock prices to the September 11 terrorist attacks. Choudhry (2005) examines the return and time varying beta effects of terrorism for 20 US firms. Another thread of the literature has centred on the impact of September 11 on the world capital markets. For instance, Chen and Siems (2004) examine the short term global market reactions to 14 terrorist and military attacks. Hon and Strauss (2004) investigates the contagion effects of September 11 attacks in the global markets. Drakos (2004) studies the impact of the September 11 terrorist attacks in the US and international airline stocks. Ito and Lee (2005) compares the impact of September 11 attacks and its after effects on airline demand in Australia, Canada, Europe, Japan, and the US. Richman, Santos and Barkoulas (2005) investigate the short and long term effects of the September 11, 2001 terrorist attacks.
on 28 countries. Nikkinen, Omran, Sahlstrom and Aijo (2008) examine the short term impact of September 11 attacks on market’s return and volatility in 53 countries.

The studies examining the impact of terrorism on the financial markets, with the exception of Chem and Siem (2004), have only considered the September 11 attacks in the U.S. There is a general consensus on the destabilising effects of the September 11 attacks given that the U.S is a main hub of the world financial market. However, it is not known how other economies have responded to subsequent terrorist acts. As such, it would be perilous to generalise the market response in different countries resulting from September 11 terrorist attacks to cover all terrorist attacks. This leaves a gap in the literature relating to how subsequent terrorist events have affected capital markets in other important regional financial centres. Since the terrible and unfortunate events on September 11, terrorists have struck and wrecked havoc in Bali, Madrid, London, and Mumbai.

Furthermore, there is recognition in the literature that terrorist events could have differential impacts on industry portfolios. The size and distribution of the economic impact of terrorism, as discussed above, could differ across sectors, depending on the resilience of the markets (Bruck and Wickstrom, 2004). Nevertheless, with the exception of the airline industry, the published literature has largely ignored how industry portfolios respond to terrorist events. Ito and Lee document a substitution effect between international travel and domestic travel following September 11, suggesting some positive effects. Cam (2006) also notes some positive reaction for the US market following September 11. On the other hand, Ramiah, Cam, Calabro, Maher and Ghafouri (2009) show that ten Australian sectors reacted negatively to the
events of September 11, whilst the subsequent terrorist attacks hardly affected these industries.

We posit that a comprehensive Indonesian study involving the reaction of industrial portfolios to different terrorist events is worthwhile as the country capital market has experienced the possible effects of both domestic and transnational terrorism. This paper adds incremental knowledge to the literature through additional country studies relating to spillover effects of terrorist risk as we investigate the impact of international, in addition to domestic terrorism, on the Indonesian economy.

III. Five Recent Acts of Terrorism

On the morning of Tuesday 11/09/2001, terrorists hijacked several planes and crashed them in various locations in the United States, killing over 3,000 civilians. The Bali bombings, an act of domestic terrorism this time for Indonesia, occurred on Saturday, the 12th of October, 2002 in the tourist district of Kuta on the island of Bali. The bombings are recorded as the worst terrorist activity in the history of Indonesia and resulted in 38 Indonesians and 164 foreigners fatalities and injured another 209 people. Another act of terrorism occurred in Spain on the morning of Thursday, March 11, 2004 in Madrid. There were a series of bombings on the commuter train system that killed 191 people and wounded over 2,000. A year after the Madrid bombings, on Thursday, the 7th of July, 2005, the terrorists diverted their attacks to the United Kingdom. This time they targeted the public transport system in London and caused 55 fatalities. There was an attack in Mumbai on Tuesday, the 11th of July, 2006 on the Suburban Railway. This terrorist incident killed 209 people and injured over 200. In November of 2008, Mumbai was once more under attack. More recently, in July of
2009, there was yet another terrorist attack in Indonesia. We acknowledge the subsequent terrorist attacks after the five listed above, but we limit our study to the five terrorist attacks to isolate the effects of the current global financial crisis.

IV. Data and Methods

We apply statistical tools in our analyses and draw inferences to explain the strong Indonesian government action against terrorist groups, vis-à-vis, economic cost of terrorism to the economy. As indicated above, Indonesia has convicted more terrorist than any other national government. The use of the statistical tools here implies that we do not eyeball data in order to draw conclusions but rely on statistical inference that is less apt to change.

We argue that the financial consequences of terrorism, which results in an increase in systematic risk and a reduction in wealth (resulting from a drop in prices in the equity market), are important elements in this current environment. Further they are also vital facets when assessing the Indonesian government response to terrorism. We postulate the following three scenarios after a terrorist attack. First, if investors perceive an increase in the expected costs or a decrease in their revenue after the event, they will respond negatively to such event. Secondly, if investors perceive a decrease in the expected cost or an increase in their revenue, they will react positively to the event. Finally, investors may not react at all if they do not foresee any change in their cost and revenue analysis. In a similar manner, the systematic risk can increase, decrease or remain unchanged by the amount of the terrorist risk if the cost and benefit structure was to be altered. As it is not clear as to which of the possible
outcomes will prevail, this paper investigates these theoretical scenarios. The empirical analyses aids in clarifying the investor reactions.

To examine the issues raised above, we collect stock price data from around the dates of the five terrorist events in the United States, Indonesia, Spain, the UK and India, and investigate the impact of these terrorist attacks on industry portfolios in Indonesia. The sample period for our data is between August 1999 and January 2008. As mentioned above, we do not include terrorist events subsequent to the end of the sample period to isolate the effects of the global financial crisis. Our data includes 344 daily stock indices for 16 industry portfolios, the stock market index for the Jakarta stock exchange (the LQ45 index, which is our proxy for market returns), and the Indonesia Deposit 3-Month Middle Rate (the proxy for risk-free assets). Data on the stock indices and deposit rates are sourced from Datastream. We categorise firms listed on the Jakarta Stock Exchange into industrial portfolios using the Global Industry Classification Standards (GICS) to form 16 industrial portfolios. We report an average daily return of 0.02% on the Indonesian stock market over the sample period, with the highest return, 0.11%, recorded in the energy sector. The worst return in the sample period, -0.11%, was recorded in the real estate sector. Besides the real estate sector, we document negative average returns for three other sectors: general retailers (-0.02%), information technology (-0.06%), and media (-0.03%).

We investigate whether terrorist activities generate returns that are statistically different

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5 The full list of average returns over the sample period is reported as follows: Automobile (0.03%); Banking (0.01%); Consumer Durables & Apparel (0.03%); Consumer Staples (0.04%); Diversified Financials (0.00%); Energy (0.11%); General Retailer (-0.02%); Health Care (0.04%); Industrials (0.03%); Information Technology (-0.06%); Insurance (0.03%); Materials (0.07%); Media (-0.03%); Real Estate (-0.11%); Telecommunication (0.06%); Utilities (0.05%); All Sectors (0.02%).
from these daily averages. Statistically significant changes indicate change in wealth which has implications for the productive sectors of the Indonesian economy.

Methodology

Return Analysis

The goal here is not to demonstrate the use of statistics but to make obvious the steps we implemented to ascertain the changes in wealth and risk as a result of terrorist actions on the Indonesia economy. To understand the wealth and risk effects of domestic and transnational terrorist risk on the Indonesian economy, we employ event study methodology to estimate and draw inferences about the impact of terrorist attacks on the Indonesian stock market. In this methodology, the events are the five terrorist acts in the United States, Indonesia, Spain, the UK and India detailed above. The event dates in our model, that is the dates on which the terrorist attacks are considered to have occurred, do not always coincide with the dates on which the terrorist attacks took place. For instance, the Bali bombings occurred on a Saturday when the Indonesian market was closed. We, however, examine portfolio and market performance on the next business day, which was 14/10/2002, as that is the first opportunity for market participants to demonstrate their reaction. In a similar manner, time zone differences were also taken into account for the September 11, Madrid, and London terrorist attacks.

The daily returns of each stock are calculated using the natural logarithmic of the stock return relative index. Following Brown and Warner (1985), the \textit{ex-post} abnormal returns for each Indonesian listed firm are calculated as the difference between the actual observed returns and the expected return. That is the return that is not due to systematic or market wide influences. The daily expected returns are estimated using
three different asset pricing models namely the average of the daily returns, a market model, and an excess return capital asset pricing model (CAPM)\(^6\) over the last 260 observed daily returns. In estimating of the asset pricing models, the returns on the LQ45 index and the Indonesian Deposit 3-Month Middle Rate are used to proxy the market return and the risk free rate, respectively. The abnormal returns, returns in excess of the expected level, for industry are then obtained by averaging the abnormal returns of each firm within the industry. A positive (negative) change in the abnormal returns represents an increase (decrease) in wealth immediately after the terrorist attack for investors who invested in this particular industry. These industrial portfolios contain both firm-specific information and the responses to the actual terrorist event. We are unable to exclude the firm-specific information as such information was not readily available for a significant portion of our sample.

A question arises as to whether the abnormal returns estimated, which is the change in wealth, estimated is a mere coincidence. We use the z-score as test statistic to determine the probability of obtaining the abnormal returns estimated. If the test statistic is below ±1.68 for the abnormal returns for either the market index or an industrial classification sector, we cannot support the argument that there has been a measurable (statistically significant) change in wealth as a result the respective terrorist actions. We aggregate the periodic abnormal returns for the individual Indonesian industries over five days and obtain the cumulative abnormal returns (CAR). That is the excess return investors receive over the 5 day period and

\[ E(R_i) = \beta_0 + \beta_1 (\tilde{r}_{mt}) \]

and

\[ E(R_{it}) = \beta_0 + \beta_1 (\tilde{r}_{it} - \tilde{r}_m) \]

respectively, where \( \tilde{r}_{mt} \) is the return on the LQ 45 index and \( \tilde{r}_m \) is the return on the Indonesian Deposit 3-Month Middle Rate.

\(^6\) The market model and CAPM are given as \( E(R_i) = \beta_0 + \beta_1 (\tilde{r}_{mt}) \) and \( E(R_{it}) = \beta_0 + \beta_1 (\tilde{r}_{it} - \tilde{r}_m) \), respectively, where \( \tilde{r}_{mt} \) is the return on the LQ 45 index and \( \tilde{r}_m \) is the return on the Indonesian Deposit 3-Month Middle Rate.
measures the ability of the Indonesian equity market (or more generally, wealth) to rebound or deteriorate further five days after the terrorist attack.

**Terrorist Risk Analysis**

We assume here that terrorist risk is a component of market or systematic risk, the type of risk that affects the prices of all financial assets although in different proportions. Intuitively, one would expect terrorism risk to be high around the days surrounding a terrorist attack, thus increasing the systematic risk on those days. However, this may not hold for every Indonesian sector (Cam 2006). To investigate the changes in systematic risk following a terrorist attack, we use an excess return CAPM. First, the CAPM is fitted with a multiplicative dummy variable to capture the changes in systematic risk on the days of the terrorist attacks. This dummy variable takes the value of 1 on the first day of trading after the event, and 0 otherwise. Next, we calculate the long-term effects of these attacks on systematic risk. To that end, we use a multiplicative structural dummy variable which take the value 0 prior to each terrorist attack and 1 after the event. In the estimation of the CAPM, we correct for the financial econometric problems.

**V. Results Discussion**

We present and discuss the results of our empirical analyses examining the impact of five terrorist attacks on the Indonesian stock exchange in this section. In particular, we examine the risk and return characteristics of 16 Indonesian industries and Indonesian market index following five terrorist attacks in the USA, Indonesia, Spain, UK and India. We segment the discussions to correspond to each terrorist attack to enhance clarity.
United States- September 11 2001

The Indonesian equity market was closed at the time of the terrorist event on September 11 but opened the day after the attack. Adjusting for the time difference, we assess the performance of the Indonesian equity market on 12 September 2001. Applying the methodology indicated above, we document a clear and consistent negative impact of the September 11 terrorist attacks on 14 Indonesian industrial sectors as well as the market index. Investors saw their wealth positions in these industrial sectors reduced by 2%, on average. The market index also had 2% wiped off. Interestingly (some may say surprisingly), consumer durables and apparel and media sectors saw an appreciation of 0.07% and 0.6%, respectively. This is consistent with Cam’s (2006) proposition that some industries do not react negatively to terrorist attacks. Applying the standard (Z-statistics) indicated above, we have attempted to determine whether the change in wealth estimated is a mere coincidence. We find that the decrease of -2.52%, -3.31%, -2.14%, and -1.86% for the consumer staples, diversified financials, materials and telecommunications industries, respectively, was not a mere coincidence. The diversified financial sector in Indonesia is shown to have experienced the greatest fall following the September 11 attacks. These results demonstrate the impact of transnational terrorism on Indonesia. As such, Indonesian governmental actions to forestall terrorist activities in other major financial centres may have the effect of negating domestic loss of wealth resulting from such activities. Previous studies also document negative reactions to the September 11 event in the airline industry. For example, Cam (2006) reports a 35%

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7 The sectors are automobile, banking, consumer staples, diversified financials, energy, general retailer, healthcare, industrials, information technology, insurance, materials, real estate, telecommunications, and utility.
fall in the returns for the airline and airport industry after the September 11 attacks in the US. Carter and Simkins (2004) and Drakos (2004) demonstrate a 10% to 16% decline in Japanese airline businesses immediately after the attack. The evidence documented here extends the current knowledge to other industries. Also, Chen and Siems (2004) document a fall of -5.2% after the September 11 attack for the banking sector whilst our results only show a fall of -1.35%.

We also examine the five-day aggregate (cumulative) abnormal returns following the September 11 attacks. This sheds light on the capital market’s ability to rebound from the terrorist attacks. Generally, the cumulative abnormal returns estimated reinforce negative sentiment immediately after the September 11 attacks. However, the appreciation of wealth in consumer durables and apparel (0.35%) and media (0.77%) sectors experienced immediately after the attacks persisted 5 days after the attacks. All the other industrial sectors, as well as the market index, demonstrated a negative effect on equities listed in the Indonesian Stock Exchange following the attack. Six out of the sixteen industry sectors as well as the market index, show statistically significant aggregated abnormal return, indicating a pronounced negative sentiment. Our results also show that the diversified financial sector continued to be the worst-performing sector 5 days after the event, losing 6% of its wealth initial position prior to the attacks.

It is reasonable to conclude that Indonesian industries and the market portfolio were, somewhat, strongly negatively affected following the September 11 attack. Based on the modern portfolio theory of risk and return relationship for risky assets, it is fair to

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8 Automobile, consumer staples, diversified financials, general retailer, industrials, and telecommunication.
assume that this drop in returns will be matched by an increase in the systematic risk of these equity portfolios. Therefore, we next sought to ascertain whether the empirical results uphold this theoretical proposition. As indicated above, we estimate a modified version of the CAPM for that purpose. This model only explains if there is a change in the slope-systematic risk-beta of the CAPM. A positive (negative) coefficient of the multiplicative dummy variable reflects an increase (decrease) in systematic risk.

We document positive coefficients for ten industrial sectors\(^9\) as well as the market index. To imply a significant change in the systematic risk for the industry or the market, the coefficient of the multiplicative dummy variable must be different from zero. We find no evidence of a change in systematic risk for the sixteen industry portfolios. For instance, we find that the beta of the banking sector was 0.345 prior to the attack and it increased to 0.125 subsequent to the attack. However, we cannot explain this change as being the short-term change in systematic risk given that the z-statistic is not statistically significant. The market portfolio, however, shows a statistically significant increase in systematic risk. We further examine whether there is a long-term change in systematic risk. We observe that four industries—banking, healthcare, material, and utilities—show an increase in the long-term increase in systematic risk. For example, the systematic risk of the utility industry increased by 0.093 after the September 11 attacks. Our empirical results offer some support for the transnational theory of Lee, Enders and Sandler (2009) in that they show that September 11 altered a foreign country’s risks and returns profile in the short term. However, the sector analyses show that terrorist attacks do not always lead to

\(^9\) Banking, consumer durables and apparel, consumer staples, diversified financials, healthcare, industrials, materials, media, real estate, and telecommunications.
increases in systematic risk. The Indonesian equity response is thus consistent with Nikkinen et al. (2008), Ito and Lee (2005), Richman et al. (2005) Chen and Siems (2004) and Drakos (2004), who also observed no change in systematic risk levels following the 9/11 events in some portfolios.

Bali

The Bali bombings, an act of domestic terrorism, occurred on Saturday, the 12th of October, 2002 in the tourist district of Kuta on the island of Bali. The first trading day after the attack was on Monday, the 14th of October, 2002. Our examinations reveal a consistent and negative impact of the Bali bombings on the Indonesian market. The sector analyses show an average 6% decline relative to the wealth position of investors. The results show much larger sectoral declines in abnormal returns after the Bali attacks compared to the September 11 attacks. For instance, the Indonesian market index after the Bali bombing fell by -5.53%, as opposed to a fall of -1.93% following September 11. The biggest fall for the industrial portfolios was experienced by the healthcare sector (-8.8%). In movement analogous to the reaction following the September 11 event, the consumer durables and apparel sector exhibited the least impact (-0.83%). The cumulative abnormal returns for the market index and the industrial portfolios five days after the event broadly suggest the persistence of the initial negative response. The evidence shows that three industries—diversified financials, industrials, and media—rebounded after the initial decline and posted positive aggregated abnormal returns over the subsequent 5 days. However, only three industry portfolios—energy, informational technology, and materials—had significant aggregate returns over the following five days.
Analogous to the discussions following the September 11 attacks, we find an increase in the short term systematic risk for the Indonesian market as a whole. However, this evidence is not replicated when we break the market down into the 16 industry sectors. We also find an increase in long term systematic risk for 50% of the industry portfolios. The market index also demonstrated a significant increase of 0.015.

Worthington and Valadkhani (2005) and Ito and Lee (2005) observed that the Bali events negatively affected the Australian consumer discretionary sector and the airline industry in other countries.

Madrid

The terrorist attacks in Spain happened on the morning of Thursday, March 11, 2004 in Madrid. The Indonesian market opened on the day following the terrorist attack. We apply the same empirical techniques described in the methodology section to examine whether the risks and returns for the Indonesian industries and the market index were responsive to the terrorist attacks in Spain. The general industrial sectors and market response immediately after the attacks were indicative of a decline in returns, as most of the abnormal returns, with the exception of six industries (consumer durables and apparel, diversified finance, general retailer, IT, media, and telecommunications) were negative. Two of the sixteen industrial portfolios are shown to have significant abnormal returns, albeit with conflicting fortunes. Whereas the healthcare sector posted significantly negative abnormal returns of \(-3.33\)%, the information technology industry is shown to have had significant abnormal returns of 6.77%. The abnormal return for the market index was not significant. The results indicate that three sectors, consumer durables/apparel, general retailers, and

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10 Banking, energy, general retailer, health care, industrials, insurance, materials, and real estate.
information technology, rebounded and posted positive aggregate abnormal return in the five days following Madrid terrorist attacks. Of these, consumer durables/ apparel and information technology exhibited significant and measurable aggregate abnormal return. Also, the automobile and media sectors show significantly positive aggregate abnormal return five days after the attack. The market index, although negative, was not statistically significant. Furthermore, the results from CAPM, which are not reported, show no changes in the systematic risk in either the short or the long term.

London
The terrorists attack in London on Thursday, the 7th of July, 2005 targeted the public transport system in London and caused 55 fatalities. The Indonesian equity market’s response to the attack was muted. Neither the market index nor the industrial portfolios recorded any measurable impacts on abnormal returns on the first day of trading or five days after the attack. Nevertheless, the raw abnormal returns show that automobile, energy, industrial, material, media, and telecommunications sectors were negatively influenced by the event. All other sectors posted positive abnormal returns. Five days after the event, the consumer durables and apparel, diversified financials, energy, industrials and utilities sectors showed negative CARs. The CARs for all other industries, as well as the market index, were positive. Given the lack of statistical support, we say that these returns were influenced by the terrorist events in London. As with the terrorist events following the Madrid bombings, we find no changes in systematic risk in either the short or the long term.

Mumbai
The Mumbai attacks of Tuesday, 11th of July, 2006 killed 209 people and injured over 200. The Indonesian market showed no statistically measurable impact following this
attack. We note, though, that fifty-six percent of the industry portfolios, as well as the market index, reported negative abnormal returns. We observe that none of these sectors rebounded five days after the Mumbai terrorist attacks, as all of the industries posted statistically insignificant abnormal returns. Further, there was also no evidence of a change in short term or long term systematic risk.

VI. Summary and Conclusion

Economic warfare is at the heart of terrorism and financial markets are addicted, both direct and indirect, by terrorist attacks which leave the markets with disruptions and increased levels of uncertainty and market volatility. The events of September 11 affected many countries, including Indonesia, through economic spillovers, collateral damage, or security expenditures and raised the awareness levels of the threat posed by transnational terrorism. To assist in understanding the fallout of the actions of terrorists on the Indonesian economy, we have employed empirical tools, just like other social scientists, and made deductions. We have applied empirical techniques to examine the impact of domestic and transnational terrorism on return characteristics of 16 Indonesian sectors as well as the market index. When the abnormal return deviation is large significant, we deduce a change in wealth from the initial position. There is a tacit acknowledgement that the micro impact of terrorist attacks on the various sectors can reveal implications that are not mirrored in the macro variables. Thus, while the Indonesian macro economy can be resilient, sectors such as banking, tourism and insurance may be vulnerable. Furthermore, the extent to which terrorist attacks have a short-term or long-term impact on various sectors and the general Indonesian market index depends on whether those acts cause investors to re-evaluate their short and long term risk assessments. It is, thus, an
interesting question to examine if the risk profile of Indonesian equity market has changed as a consequence of both domestic and transnational terrorist acts.

We document disparities in market reaction to the five terrorist attacks. Generally, the September 11 and the Bali attacks are shown to have affected the Indonesian equity market the most. Related to the US attacks, we find a deteriorating wealth position for four sectors, the consumer staples, diversified financials, materials and telecommunications industries. The strong negative effects in these sectors, the cumulative effects from other sectors of the Indonesian economy, as well as, perhaps, psychological fear depressed returns to the market as the index, LQ45, show significant fall following September 11. Although the consumer durables and apparel and media sectors posted positive abnormal returns, we could not offer any support that the documented positive returns was not a mere coincidence. The Bali bombing had a much larger impact on the Indonesian equity market relative to the September 11 event as one would expect. For example, whereas the market portfolio fell by 1.93% immediately following September 11, the LQ45 recorded a fall of 5.53%. Also, while four industrial sectors were negatively affected by the September 11 attacks, 12 industries are shown to have had significant negative returns following the Bali bombings, with much larger decline in the industry portfolios. Furthermore, the two sectors that demonstrated positive abnormal returns following September 11 attacks also reacted negatively to the Bali bombings, in line with the general market sentiment. There is no evidence of a market rebound following September 11 and Bali terrorist attacks in the window examined. The differences in Indonesian stock market behaviour in the aftermath of the two episodes of terrorist attacks are interesting. While the attacks in the US raised uncertainty about the stability of the global financial
system, it did not translate into an overwhelming negative response. The attacks in Bali perceived as mostly having a local impact, had a much larger negative impact on wealth. This is not surprising given that the loss of revenue after the Bali attacks in October 2002 is reported to have equalled 2.3% of Indonesia’s GDP (Barrett 2007). The variable response of the different sectors suggests that some sectors are less resilient to shocks depending on the source of the shock, vis-à-vis, domestic or transnational terrorism.

Also, we find no evidence of consistent increase in short-term systematic risk for the industry portfolios in the Indonesian equity market following the September 11 and Bali bombings. However, the market index suggests a general increase of 0.313 in short-term systematic risk following the Bali bombings. This indicates that the terrorist acts in Bali may have fundamentally changed perceptions of Indonesian risk market participants and the general populace. The evidence further points to changes in long-term systematic risk following the two terrorist attacks in the US and Bali. The change in Indonesia’s risk and return profile as a consequence of terrorist actions in the US provides evidence for the transnational theory on terrorism. However, the subsequent terrorist attacks in Madrid, London, and Mumbai show no measurable changes in perceived risk in Indonesia, in either the short or the long term. It may be argued that these ensuing terrorist attacks had less impact because the higher risk level was already priced in.

The evidence of the impact on abnormal returns following the Bali bombings—Madrid, London, and Mumbai—is weak at best. Apart from the healthcare and information technology industries, which posted significant abnormal returns following the Madrid
bombing, all sectors, as well as the market index, yielded insignificant returns immediately following these attacks. The healthcare sector posted negative returns and showed no signs of a rebound five days following the attacks. The information technology industry, on the other hand, posted significant and positive abnormal returns immediately following the Madrid bombing. The positive reactions persisted five days after the attacks.

For a lower income country like Indonesia, confronting terrorism through government spending could involve higher borrowing from foreign governments, institutional investors, the sale of foreign reserves, and even production of the domestic currency, thereby causing inflation (see Gupta and Clements 2004). Thus the policy reaction to terrorist threat may impact a less developed country, like Indonesia, more adversely than developed nations. Further, prolonged terrorist threats in Indonesia may force the government to progressively divert government expenditure to military and defence spending. The alternative of doing nothing would leave a populace fearful and afraid of future attacks with implications on wealth creation and economic growth. Given the evidence in this paper, the Indonesian government actions on minimizing the terrorist activities can be interpreted as an attempt to restore faith and assurances to engender economic growth.

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