

# Labor Market Conditions, Political Events and Palestinian Suicide Bombings\*

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January 17, 2005

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## Abstract

*Objectives.* This paper analyzes the relationship between Palestinian suicide bombings and economic and political conditions from 1993 to 2001. Labor market conditions could affect the number of terror attacks because when the economy worsens, the opportunity cost of engaging in suicide terrorism decreases. An alternative explanation is that suicide bombings are responses to changes in the political environment. *Methods.* Count data regression models are employed to explore the relative importance of economic and political factors in determining the frequency of suicide bombings. *Results.* Economic conditions explain some of the occurrence of suicide bombings from 1993 to 2001, and some political events are also strongly correlated with bombings. *Conclusions.* The results imply that the roots of suicide bombing may lie in the unfulfilled economic promises of the Oslo peace process, but specific acts by Israelis are a proximate cause of the attacks.

I'm frustrated, and if I reach the point where I can no longer work and feed my children, then maybe I will become a suicide bomber, too. *Ahmed Shibon, Palestinian worker from the West Bank* [31]

## 1 Introduction

From 1993 to 2001 Palestinian terrorists killed hundreds of Israelis, with most of these deaths coming at the hands of suicide bombers. Although suicide bombing was once a rare phenomenon, it is now a primary issue in the Israeli-Palestinian conflict. The primacy of suicide bombing is shown through the recent attention given to Israel's attempt to build a separation barrier between Palestinian population centers and Israel: a move designed to enhance the security of Israelis, but one which will have a significant negative impact on the Palestinian economy and impede the creation of a Palestinian state [4].

This paper examines the degree to which economic and political conditions motivate suicide bombers. While the epigraph and popular perception indicate that economic factors play an important role, the relationship between changes in labor market conditions and the occurrence of suicide bombing has not been examined empirically. Important political events, on the other hand, are often cited by the groups carrying out the attacks, saying that they are responses to Israeli aggression.

The link between economic conditions and terrorism has received considerable attention since the September 11, 2001 terrorist attacks. Many policymakers claim that poverty has fueled terrorism and that reducing third world poverty could be an effective anti-terrorism policy. For example, President Bush at a March 2002 anti-poverty summit stated, "We fight against poverty because hope is an answer to terror." [12] Bush's statement represents a continuation of the opinion of the Clinton administration. President Clinton, in an address promising more aid to the Palestini-

ans, claimed that, “For too long, too many young people have turned to terrorism and old hatreds, partly because they had nothing better to do.”[9] <sup>1</sup>

With heightened attention from policymakers, the relationship between economics and terrorism has also piqued the interest of economists.<sup>2</sup> In a recent study, Krueger and Maleckova [23] examine the relationship between political violence and poverty. Using data from several countries, they find that it is not the poor and uneducated that primarily support terrorism. Economic status, especially in the form of educational status, is either positively related or not related to willingness to support or engage in political violence. They find that Hezbollah militants in Lebanon have higher family incomes and higher education levels than the rest of the population. They also report findings from Palestinian opinion polls that show that support for Palestinian terrorism is not affected by education level.

A related paper by Berrebi [7] examines the educational and economic status of Palestinian suicide bombers. His findings are that, similar to Krueger and Maleckova, there is no evidence to show that suicide bombers are poor or uneducated. In fact, Berrebi finds that these bombers are more educated and wealthier than the rest of the Palestinian population. Thus, when looking at individuals, there is no evidence that those who are relatively deprived are more likely to engage in terrorism.

But despite the lack of a cross-sectional correlation between poverty and terrorism, aggregate economic conditions still may be correlated with the timing of Palestinian suicide bombings. While the proclivity to engage in suicide terrorism may be independent of (or even positively correlated with) educational status or family wealth, changes in the economic environment may still

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<sup>1</sup>Other editorial writers and policymakers have claimed that providing more foreign aid may help deter would be terrorists. (See, for example, Sokolsky and McMillan [28] and Tyson[29]).

<sup>2</sup>Given that many of the groups carrying out the attacks have a religious basis, another related literature involves the economics of religious organizations. In a recent paper related to the topic presented here, Berman [5] presents a theoretical model that helps explain behavior by radical religious groups using a rational choice framework.

cause more people to become willing to engage in terrorism.

Despite theoretical support for the hypothesized relationship between terrorism and economic conditions, groups carrying out the attacks (primarily Hamas and Islamic Jihad) dispute any such relationship. Instead, these groups depict the bombers as dedicated soldiers, simply carrying out military attacks [1], [19]. As such, these acts are claimed to be no different in their motivation than the shootings, kidnappings, and other attacks that predated the rise in suicide bombing.<sup>3</sup>

This paper assesses the degree to which labor market conditions and political conditions in the West Bank and Gaza Strip (WBGs) affect the frequency of attacks. I present results from several count data models that regress the number of suicide bombings originating from different regions on those regions' labor market conditions and dummy variables for political events. The results from these models imply that poor labor market conditions are correlated with increases in suicide bombing, but that specific political events are also important.

The rest of paper is organized as follows. Section 2 describes some features of Palestinian suicide bombings, and section 3 describes the Palestinian economy and labor market. Section 4 presents a theoretical framework based upon occupational choice. This framework is given an empirical specification in section 5, which is estimated in section 6. Section 7 concludes.

## 2 Palestinian Suicide Bombings and Political Events

Figure 1 depicts the quarterly frequency of suicide bombing and all terrorist attacks, where the y-axis represents the number of attacks per quarter. Data on terrorist attacks, including suicide bombings, are from the International Policy Institute for Counter Terrorism [11] and have been verified by checking information from the Israeli Ministry of Foreign Affairs [24] and news accounts

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<sup>3</sup>A recent paper by Berman and Laitin [6] examines what forces lead groups to be more likely to use suicide attacks rather than more conventional attacks. The authors find that suicide attacks are distinguished by the types of targets chosen.

in *The Jerusalem Post* and *The New York Times*. The first characteristic to note is that suicide bombings by Palestinians are a relatively new phenomenon. Although terrorist attacks by Palestinians against Israelis in the forms of shootings, stabbings, hijacking and hostage taking have occurred since the 1960s, the first suicide bombing was not until 1993.

A second characteristic to note is that bombings often coincided with the timing of important events in the Israeli-Palestinian peace process. For example, in 1995 the frequency of the bombings increased in the early summer as the deadline approached for the agreement to redeploy from West Bank cities (the “Oslo II” agreement). In August the bombing abruptly ended and ceased for over six months as the Palestinian Authority leader, Yasser Arafat, pressured Hamas and Islamic Jihad to halt bombing during the Oslo II redeployment [14].

A third characteristic is that these bombings are often in response to acts of violence by Israelis. For example, consider two events that preceded waves of bombings. The first is the Ibrahimi mosque massacre. In February 1994 the Israeli-American Baruch Goldstein killed 30 Palestinian worshippers in the Ibrahimi Mosque in Hebron. After the end of the 40 day mourning period, there were two intense bombings against Israelis targets. A second spate of bombings occurred in February and March of 1996. As mentioned above, in 1995 before and during the withdrawal of Israeli troops from six West Bank towns, Hamas and Islamic Jihad suspended their attacks. On January 5, 1996, Israeli agents assassinated Yahya Ayyash, who was the mastermind behind most of the suicide bombings in 1994 and 1995, by detonating a bomb in his cellular phone [14]. Six weeks after Ayyash’s death, Hamas and Islamic Jihad retaliated with a series of bombings that killed over 60 Israelis in a matter of days.

A fourth characteristic of the bombings is that bombings have become much more frequent since the beginning of the Al-Aqsa intifada (uprising) in September 2000.<sup>4</sup> Before this period only

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<sup>4</sup>More recently, the frequency of suicide bombing has slowed again. Only eight suicide bombings occurred in 2004, less than half of the number in the first three months of 2002.

one quarter saw more than three suicide bombings, but each quarter of 2001 had four or more bombings. During the intifada the groups behind the bombings and the characteristics of the bombers also changed.<sup>5</sup> Despite the increase in bombing activity during the Al-Aqsa intifada, it should also be noted that these bombings did not begin until the end of October, and they did not occur with much frequency until the beginning of 2001.

### 3 The Palestinian Economy from 1993 to 2001

While consistent measures of the performance of the Palestinian economy are not available from the beginning of the 1990s, some trends are clear. The Palestinian economy stagnated from 1993 to 1999, and after the advent of the al-Aqsa intifada, the situation deteriorated rapidly. The level of poverty in the WBGS has risen since 1993 primarily because of a weak and volatile labor market that resulted from repeated border closures, low investment, and a lack of private sector expansion. Closures of the border between the WBGS and Israel, combined with a strict permit policy for Palestinians working in Israel when the border was open, has caused billions of dollars of losses to the Palestinian economy since 1993.<sup>6</sup> As more Palestinians were allowed to work in Israel from 1997 to mid 2000, the Palestinian economy improved, but without a final peace agreement, private investment was still not forthcoming. With the beginning of the al-Aqsa intifada in September 2000, income has fallen even further. The World Bank [4] estimates that between September 2000 and December 2002, per capita income in WBGS fell by 40 percent.<sup>7</sup>

The health of the Palestinian labor market can be measured directly by examining the

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<sup>5</sup>Recent bombers have included women, secular Palestinians, married men and older men while earlier bombers were typically young, religious and unmarried men.

<sup>6</sup>While there has been substantial foreign aid flowing into the Palestinian economy to mitigate the negative effects of the closure, including as much as one billion dollars in 2003, this aid has not fully mitigated the effects of closures. Furthermore, much of the aid has been diverted from development projects that would have supported infrastructure construction, but now has to be spent on revenue support for the Palestinian Authority and make-work support programs. [4]

<sup>7</sup>See UNSCO [26] for various reports on the economic effects of the al-Aqsa intifada.

changes in the unemployment rate and average wages. Figure 2 plots the unemployment rate for 15 to 24 year old men in the West Bank and Gaza Strip from 1993 to 2001. These figures, along with wage data, come from two sources: the Israeli Central Bureau of Statistics (ICBS) and the Palestinian Central Bureau of Statistics (PCBS). ICBS labor-force data are available from 1981 to 1995.<sup>8</sup> After the second quarter of 1995, data collection was transferred to the PCBS.<sup>9</sup> From 1993 to 1995 there was relatively little variation in the unemployment rate, but from 1995 to 1998 the unemployment rate was both high and highly variable. This volatility arose from the imposition of closure of Palestinian territories, usually in response to a terrorist attack. Because as much as one third of the Palestinian labor force was employed in Israel during this period, closures had a dramatic effect on the labor market outcomes of Palestinians. From 1998 through late 2000, unemployment decreased as more Palestinians were allowed to reach jobs in Israel. While most of the analysis will use the micro data from the PCBS, I include 1993 to 1995 since one of the specifications will use the longer trend, from 1993 to 2001.

Figure 3 plots real median daily wages in the West Bank and Gaza Strip from 1993 to 2001, showing some wage growth during this time, especially from 1998 to 2000. These data show considerably less volatility than the unemployment figures partly because average wages are calculated only for those who work in the WBGS. Including Palestinians who work in Israel would raise the median wage (wages in Israel for Palestinians are generally seventy percent higher than WBGS wages) and make these wage figures more variable. While wages grew from 1996 to 2000, wages began to decline after the beginning of the al-Aqsa intifada in September 2000. While the

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<sup>8</sup>Note that much of the analysis in this paper uses a shorter time frame, from 1995 to 2001. The exclusion of the earlier years is necessitated by conducting the analysis at the sub district level and sub district variables are not available for the 1993-1995 ICBS data.

<sup>9</sup>The ICBS data were collected by Palestinian enumerators in the West Bank and Gaza Strip for the ICBS as part of the Territories Labor Force Survey (TLFS). Each quarterly cross-section contains approximately 10,000 observations and each household is surveyed for two consecutive quarters, not surveyed for two quarters, and surveyed again for two quarters. For Gaza, the last available data from the TLFS is for the first quarter 1994 and the last for the West Bank is the second quarter 1995. The survey methodology for the Palestinian labor force survey is similar to that of the Israeli survey.

increase in wages and decrease in unemployment just before the outbreak of the al-Aqsa intifada may seem to be evidence against the relationship between political violence and economic conditions, it should be noted that there was a similar improvement in labor market conditions leading up the 1987-1992 intifada. As noted in Angrist [3], however, the improvement in economic conditions was not uniform and those with more education saw their relative wages fall during this time.

## 4 Theoretical Considerations

Previous economic research explores the link between labor market conditions and suicide.<sup>10</sup> The economic approach to the study of suicide is based on the opportunity cost of taking one's life, with Hamermesh and Soss [18] providing a theoretical framework based upon the frustration-aggression hypothesis of Henry and Short [21]. According to this framework, when an individual's perception of the net benefit (monetary and psychological) of continuing to live falls below an idiosyncratic threshold, that person decides to commit suicide. Thus, when aggregate economic conditions worsen, more individuals fall below their personal threshold and suicide rates increase.<sup>11</sup> More recent empirical research shows that economic factors are helpful in explaining variations in suicide rates over time, across countries, and across age groups (see Huang [22] and Viren [30]).

Another theoretical framework that ties economic conditions to suicide rates is Easterlin's [10] relative-income hypothesis. According to this hypothesis, large birth cohorts will have relatively

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<sup>10</sup>A related literature focuses on the relationship between labor market conditions and violent crime rates. The theoretical framework used in Grogger [15] and others describes time allocation between two sectors: crime and employment. Grogger [15] and Richard Freeman and William M. Rodgers III [13], among many, find that variation in crime rates is partially explained by changes in labor market opportunities of young men.

<sup>11</sup>The degree to which this phenomenon should be thought of as suicide at all raises the issue of the overall Palestinian suicide rate. Not only should suicide bombing increase during periods of low wages and high unemployment, but all forms of youth suicide should increase. The Palestinian Central Bureau of Statistics does not systematically collect suicide data. However, anecdotal evidence (Amr [2] and Abdulhadi [17]) suggests that suicide rates increased in 1997, even as tensions between Israelis and Palestinians were at a lull. In fact, one observer notes, "during the ...intifada ...youths that wanted to kill themselves would join in clashes against the Israelis. Now there are no soldiers, so they revert to pills and rat poison." [2] Similarly, Hamas has decried some unsanctioned attacks by the very young as being so hopeless, that they amounted to little more than suicide [27]. It is also worth noting that youth suicide rates by young Jewish Israeli men increased from 1984 to 1995, especially for those in the military [32].

worse economic outcomes, compared to their parents' relatively small birth cohorts. Members of large cohorts will not be able to attain the high standard of living of their parents, resulting in frustration and high suicide rates.

An important theoretical implication of both of these streams of literature is that cross-sectional studies comparing wealth or education of terrorists to the population as a whole is not a sufficient means by which to test the effects of economic conditions on suicide terrorism. Instead, if we take the theoretical literature seriously, one should not be surprised by findings like those in Krueger and Maleckova [23] and Berrebi [7]: there is no reason to expect that poor people are more likely to become frustrated to the point of violence than are wealthier people. Those who feel the frustration most acutely from a change in their economic conditions may be high status according to their wealth or education level. However, so long as aggregate economic conditions are positively correlated with the outcomes of the groups most likely to become frustrated, then aggregate conditions should affect the number of suicide bombings.

Following the literature on the economics of suicide, one can use an opportunity cost argument to explain the link between changes in labor market conditions and the frequency of suicide bombings. Suppose there are two ways a Palestinian youth can spend his time: seeking out job opportunities in the labor market or seeking "opportunities" in the suicide bombing sector. When labor demand shifts in the market sector, labor supply to the bombing sector changes. If labor demand increases in the market sector, wages increase and unemployment decreases, resulting in fewer youths being willing to become suicide bombers. When labor demand falls, wages fall and unemployment rises. Since the opportunity cost of being a bomber is now lower, more young people will seek out opportunities in the bombing sector. Thus, weak labor market conditions increase the supply of bombers and the number of suicide bombings.<sup>12</sup>

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<sup>12</sup>One can consider that there are at least two types of labor used in suicide bombings: bombers and "handlers," who recruit and train the bombers. As the opportunities in the market sector decrease, more workers are willing to

An additional cost that can affect the number of suicide bombings is the intensity of Israeli (and Palestinian) anti-terrorism efforts. When these efforts are more intense, as they are during a closure, the cost of carrying out a bombing will increase, leading to fewer bombings. The decline in suicide bombings since 2002 may reflect this increase in costs, as parts of the barrier separating the West Bank from Israel were completed in 2003 and 2004 [16].

While closures should increase the costs of engaging in terrorism, some political events will increase the demand for bombers. If the gains to the organizations' prestige is greater during certain times, then demand for bombers will increase.

## 5 Empirical Model

This section develops an empirical model based upon the above theoretical framework. The basic model estimates the effect of labor market conditions and political events on the frequency of suicide bombing in Israel. The dependent variable in this model is the number of suicide bombings per quarter by sub district, implying that a count data model will be appropriate.<sup>13</sup>

The linear version of the estimating equation is

$$Bombing_{jt} = \alpha + \beta_1 Wage_{jt} + \beta_2 Unem_{jt} + \gamma Event_{jt} + \epsilon_{jt}. \quad (1)$$

$Bombing_{jt}$  is the number of suicide bombings originating from sub district  $j$  in period  $t$ .

$Wage_{jt}$  represents the median daily wage (in New Israeli Shekels) in sub district  $j$  at time  $t$  and

$Unem_{jt}$  is the unemployment rate for 15 to 24 year old men in sub district  $j$  at time  $t$ .  $Event_{jt}$  is

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become handlers. As the supply of handlers increases, terrorist organizations can either select more qualified handlers or pay them less. This will also lead to more suicide bombings.

<sup>13</sup>Sub districts are based upon governates, areas around and including population centers, such as large towns or cities. Eleven sub districts are denoted in this analysis. In the West Bank they are Jenin; Tulkaram and Qalqilya; Nablus; Hebron; Ramallah; Bethlehem and Jericho; and Jerusalem. The Gaza Strip is divided into four sub districts: North Gaza; Gaza City; Middle Gaza; and South Gaza.

an indicator of the occurrence of an important political event, such as the Ayyash assassination or the signing of the Oslo II agreement.  $\epsilon_{jt}$  is the error term. The predicted sign for  $\beta_1$  is negative, and the predicted signs on  $\beta_2$  and  $\gamma$  are positive.

Because the dependent variable (bombings per quarter) consists of non-negative integers, a count-data model is appropriate. Every quarter, each individual makes the decision whether or not to become a suicide bomber and the outcome of all those individual decisions determines the distribution of the total number of suicide bombings in the quarter. The standard treatment for a “rare event” such as suicide bombing is the Poisson regression model, but there are potential estimation issues that need to be examined further.

Two estimation issues immediately arise when estimating the current model with a Poisson regression. The first is that the Poisson distribution assumes that there is a single parameter  $\mu$  that is both the mean and variance of the distribution. Most data, however, violate this assumption, with the variance substantially larger than the mean. This characteristic is known as “overdispersion,” and as seen in Table 1, the dependent variable used here (suicide bombings) is likely to have overdispersion, and it is treated by using a negative binomial model in place of the Poisson.<sup>14</sup>

A second issue that arises concerns unobserved heterogeneity between sub districts. The unit of observation is the time period-sub district. For each quarter, there are eleven observations, one from each sub district (seven from the West Bank and four from the Gaza Strip). If there is unobserved heterogeneity between the sub districts that causes error terms within a sub district to be correlated, then not taking into account these unobserved factors will lead to inconsistent estimates. For example, the greater ease of entry into Israel from the Tulkaram area may cause more bombers to originate from that sub district. In order to account for this unobserved heterogeneity,

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<sup>14</sup>While technically overdispersion refers to the relationship between the conditional mean and the conditional variance, simply comparing the sample mean and the sample variance is a convenient way of measuring the potential for overdispersion (Cameron and Trivedi [8], p. 77). Since the variance of suicide bombing is three times its mean, overdispersion is highly likely in this case.

this paper uses a fixed-effects negative binomial model as suggested by Hausman, Hall and Griliches [20].

Two additional potential problems need to be addressed. The small number of cross sectional units imply that the panel nature of the data may still suffer from serial correlation. However, using a test for serial correlation as outlined on page 275-276 of Wooldridge [33], I find no evidence of serial correlation in these data. A final issue that needs to be addressed is the possibility of reverse causality between suicide bombings and economic conditions. However, using standard tests for endogeneity using candidate instruments did not reveal residual correlation between the errors and the lagged economic variables. Furthermore, tests for granger causality imply that economic conditions granger-cause suicide bombings, but suicide bombings do not granger-cause economic conditions.

## 6 Results

Table 2 presents results from a fixed-effects negative binomial regression model.<sup>15</sup> Each specification regresses the number of suicide bombings on the median lagged wage for all men, the lagged unemployment rate for 15-24 year old men. In addition to the economic variables, I include a dummy variable for the quarter following the assassination of Yahya Ayyash (“ayyash”). Some models also include a dummy variable for quarters when peace agreements were signed (“agreement”), a dummy variable representing Palestinian control of a region (1=Palestinian control, 0= Israeli control)<sup>16</sup> and the lagged value of the closure index.<sup>17</sup> This index is the proportion of days under closure out

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<sup>15</sup>A Poisson specification was also estimated, but due to finding evidence of overdispersion, negative binomial models are preferred.

<sup>16</sup>This is an imprecise measure of Palestinian control since the unit of analysis is the sub district. Within each sub district there were areas that were both under direct Palestinian Authority military control (usually the urban areas) and areas under Israeli military control (usually smaller villages in the countryside).

<sup>17</sup>I use lagged rather than current labor market variables due to potential endogeneity problems. Since bombings often result in closures, and closures lead to higher unemployment and lower wages, current bombings will cause changes in current labor market conditions. On the other hand, while last quarter’s poor economic conditions

of total days in the period. The closure data are from the Palestinian Ministry of Labour [25] and United Nations reports on the closure [26]. These sources were checked for accuracy with various newspaper accounts, primarily *Palestine Report* and *The Jerusalem Post*.

The two main economic variables of interest in Table 2 are the lagged unemployment rate and the lagged wage rate. In the second and fourth specification (columns 1 and 4), lower wages are correlated with a higher incidence of suicide bombings, and the estimated effect is significant at the ten percent level. However, this finding is not robust across specifications.<sup>18</sup> A higher unemployment rate, on the other hand, has a positive and significant effect on the number of suicide bombings in all specifications. The statistical significance of the unemployment coefficient varies substantially, but has a p-value less than .10 in all of the models. The specifications where the significance of this coefficient declines are those where lagged values of the closure index are included in the model, as closures and unemployment are highly correlated.

In addition to labor market conditions, political events influence the number of suicide bombings. The dummy variables for the quarter of the assassination of Yahya Ayyash is consistently positive and statistically significant. However, other political variables are not statistically significant. The frequency of bombings is not affected by whether or not a political agreement is about to be signed, whether or not the Likud party is in power in Israel and whether or not there has been an election called in Israel. Additionally, PNA control of an area does not influence the frequency of bombings coming from that district.

While political events may cause suicide bombings to become more beneficial to terrorist groups, closures should make the bombings more costly. During a closure, terrorist groups must

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could affect bombings in the current quarter, causality does not run the other way. I tested for endogeneity of lagged economic variables and found them to be exogenous. Additionally, granger causality tests showed that unemployment granger-cause suicide bombings but that suicide bombings do not granger-cause unemployment.

<sup>18</sup>I also ran all of the models excluding wages from the regression. The other estimated coefficients are not sensitive to the inclusion of wages in the model.

make additional efforts to avoid check-points, and heightened security increases the probability of apprehension. Although Israel’s closures of the Palestinian territories are an effort to deter suicide bombings, the results in Table 2 imply that they are ineffective: The estimated coefficient on closures in Column 3 and Column 5 are positive and significant.<sup>19</sup>

It also is worth noting whether or not suicide bombings have different correlates than other types of terrorist attacks.<sup>20</sup> Table 3 reports regression results from models with three different dependent variables: suicide bombings, all attacks, and all bombings.<sup>21</sup>

The top panel contains results from a model that is similar to those presented in Table 2. The difference between these estimates and the earlier ones are that this model uses data that are aggregated at the regional level (Gaza and West Bank) rather than the sub district level and use the longer time series, from 1993 to 2001.<sup>22</sup> Because there are fewer cross-sectional units, the number of observations in these models is only 65, compared to 241 for the regressions from Table 2. Because of the smaller number of observations, the findings are more sensitive to model specification, especially the findings on unemployment and wages.

The middle panel reports results from a model with all attacks (stabblings, shootings, etc.) as the dependent variable. In comparing results from the top and middle panels, note that while suicide bombings are influenced by labor market conditions, this is not true of terrorist attacks in general. Neither wages or the unemployment rate has a statistically significant effect on the frequency of all terror attacks. Moreover, although suicide bombings account for well over half of

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<sup>19</sup>Since closures were part of a regime of heightened security in general, if one were able to measure the number of suicide bombings attempted, the positive correlation between bombing and closures would be even stronger.

<sup>20</sup>Recent work by Berman and Laitin [6] suggests that suicide terrorism is more likely to occur when targets are “hard”—when the probability of apprehension after an attack is very high. The current paper does not look at the targets, but notes whether shootings, stabblings and other bombings are correlated with the same political and economic conditions that are correlated with suicide attacks.

<sup>21</sup>The attacks include, but are not limited to, stabblings, shootings, kidnappings, and other types of bombings. See the International Policy Institute for Counter-Terrorism [11] for a complete list of types of attacks included. Note from Table 1 that suicide bombings are less than one third of all attacks from 1993-2001.

<sup>22</sup>While these data are more likely to suffer from problems of serial correlation and endogeneity due to the lessened cross-sectional variation, they can still be illustrative for comparing models with different dependent variables.

all bombings during this period, the estimated coefficients on wages and unemployment are not significant when the dependent variable is all bombings (bottom panel).

Table 3 also reports the estimated coefficients on political measures, including a dummy variable for the quarter of the Hebron mosque massacre. In the top panel (suicide bombings) this estimated coefficient is positive and significant in all four model specifications (columns i-iv), similar to the findings on the “ayyash” dummy from Table 2. In the middle panel (all attacks) the estimated coefficient is, likewise, positive in all four specifications. Yet only in the first two columns is the estimated effect even marginally significant (p-value<.20). When the dependent variable is all bombings (bottom panel), the estimated effect of the hebron dummy is similar to that found in the top panel.

While an impending peace agreement is correlated with an increase in the frequency of suicide bombings according to this model, there is no evidence that it increases the overall number of attacks. The estimated coefficient on the agreement dummy is insignificant in all model specifications in the middle panel. This is in sharp contrast to the positive and at least marginally significant effect that it has in the suicide bombings model. In the bottom panel, one can see that when the dependent variable is the total number of bombings, the coefficient on the agreement dummy again becomes positive and significant.<sup>23</sup>

## 7 Conclusion and Policy Implications

This paper examines the possibility that changes in the frequency of Palestinian suicide bombings are related to labor market conditions. Alternatively, these attacks may be responses to political events. Using count-data models of suicide bombings, this paper finds that increased unemployment

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<sup>23</sup>All of the models in tables 2 and 3 were also estimated with other labor market measures including varying lagged values of wages and unemployment rates and moving averages of varying lengths. None of these estimations produced results qualitatively different than those found in tables 2 and 3.

is correlated with more suicide bombings and that political events also appear to be important.

While terror groups claim that the political motivation for suicide bombings is indistinguishable from other terror attacks, this claim is not supported. Although poor economic conditions are correlated with increased suicide bombings, economic conditions do not influence the overall number of terror attacks.

Ultimately, in this paper I hope to shed some light on the issue of whether policies intended to improve the economic conditions of Palestinians will decrease their willingness to engage in suicide attacks. The results in this paper imply that economic conditions play a role in determining the frequency of suicide bombings. Therefore, economic policies targeting short-run unemployment alleviation and long-run growth could be effective in decreasing suicide terrorism. However, a poor economy is only one of many factors that motivate suicide bombings.

What may be most important to understand is the frustration level of Palestinian youth. They, unlike their parents, have been promised peace and prosperity by the Oslo Accords, and when these benefits failed to appear, their frustration soared. While aid for development is still important and may ultimately decrease the gap between aspirations and reality, policymakers must be careful to not promise too much.

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Table 1: Means and Standard Deviations for key variables

	West Bank	Gaza
Suicide bombings by sub district (1995-2001)	0.180 (0.546)	0.121 (0.328)
Suicide bombings by region	1.11 (1.98)	0.556 (0.939)
All attacks by region	5.81 (9.67)	1.89 (2.88)
wagelag	45.0 (5.05)	36.1 (3.56)
unemlag	0.146 (0.066)	0.23 (0.118)
close	0.237 ( 0.229)	0.253 (0.244)
pna	0.667 ( 0.478)	0.861 (0.351)

Standard deviations are in parentheses. All means and standard deviations are for the years 1993-2001, except for the suicide bombings by sub district. These data are confined to the later years because sub district information is not available for the last three years of ICBS data collection, 1993-1995.

Table 2: Fixed-Effects Negative Binomial Estimates of Suicide Bombings Model

	(i)	(ii)	(iii)	(iv)	(v)
lunem	9.160 (2.123)***	9.674 (2.227)***	5.099 (2.550)**	9.481 (2.198)***	5.097 (2.766)*
lwage	-0.055 (0.035)	-0.058 (0.035)*	-0.023 (0.039)	-0.064 (0.035)*	-0.004 (0.045)
ayyash	1.511 (0.628)**	1.612 (0.642)**	1.546 (0.635)**	2.474 (1.089)**	2.969 (1.466)**
agree		0.713 (0.651)		0.722 (0.653)	0.413 (0.708)
lclose			2.254 (0.753)***		2.208 (0.756)***
pna				0.923 (0.939)	0.735 (0.918)
election					-0.502 (0.571)
likud					1.024 (1.146)
Constant	1.333 (2.346)	1.216 (2.324)	-0.935 (2.507)	0.786 (2.387)	-3.422 (3.141)
Observations	241	241	241	241	241
Number of subdis2	11	11	11	11	11
Wald	33.58	33.02	42.56	33.96	41.13
P>Chi <sup>2</sup>	0.000	0.000	0.000	0.000	0.000

Standard errors are in parentheses. The dependent variable is the number of suicide bombings from a subdistrict (Jenin, North Gaza, etc.) in a quarter. The regressors include the lagged unemployment rate for 15-24 year old men, lagged median daily wage rate for all men, dummy variables for a quarter that includes 40 days past the assassination of Yahya Ayyash. Models (ii)-(v) also include a dummy variable for quarters when a major peace agreement was signed (fall 1995, spring 1997); model (iii) includes a one quarter lagged measure of the intensity of closure; and models (iv) and (v) include a dummy variable representing Palestinian control of a region (1=Palestinian control, 0= Israeli control) and model (v) includes indicators for whether or not the conservative likud party is in power in Israel and whether or not there is an Israeli election imminent. \*, \*\*, and \*\*\* indicate significance at the 10, 5 and 1 percent level, respectively.

Table 3: Fixed-Effects Negative Binomial Estimates of Models of Suicide Bombings, All Terror Attacks and All Bombings

	(i)	(ii)	(iii)	(iv)
<u>Dependent Var=</u> <u>Suicide Bombings</u>				
lwage	-0.098 (0.058)*	-0.063 (0.061)	-0.032 (0.063)	-0.002 (0.066)
lunem	4.66 (2.35)**	5.36 (2.45)**	2.50 (3.08)	7.11 (2.77)***
hebron	2.94 (0.937)***	3.53 (1.01)***	2.76 (1.09)***	2.39 (1.03)**
agreement		1.85 (0.829)**	1.45 (0.860)	1.24 (0.845)
<u>Dependent Var=</u> <u>All Attacks</u>				
lwage	-0.012 (0.038)	-0.009 (0.038)	0.005 (0.035)	0.039 (0.043)
lunem	-0.534 (1.67)	-0.473 (1.67)	-2.20 (1.80)	2.95 (1.96)
hebron	1.078 (0.073)	1.13 (0.734)	0.543 (0.719)	0.896 (0.732)
agreement		0.032 (0.518)	-0.065 (0.541)	0.240 (0.525)
<u>Dependent Var=</u> <u>All Bombings</u>				
lwage	-0.100 (0.060)	-0.072 (0.061)	-0.039 (0.060)	-0.034 (0.063)
lunem	-0.309 (2.09)	0.068 (2.12)	-1.97 (2.61)	1.05 (2.26)
hebron	2.02 (0.900)**	2.49 (0.95)***	1.77 (1.02)*	2.11 (0.943)**
agreement		1.70 (0.724)**	1.34 (0.756)*	1.38 (0.725)*

Standard errors are in parentheses. This table presents results from a conditional fixed effects negative binomial model of the number of terrorist attacks on lagged unemployment rate for 15-24 year old men, lagged median daily wage rate for all men, dummy variables for a quarter that includes 40 days past the two major events (massacre at the Hebron mosque and the assassination of Yahya Ayyash), and three quarter dummies. Models (ii)-(iv) also include a dummy variable for quarters when an major peace agreement was signed (fall 1993, fall 1995, spring 1997); model (iii) includes a one quarter lagged measure of the intensity of closure; and model (iv) includes a dummy variable representing Palestinian control of a region (1=Palestinian control, 0= Israeli control).\*,\*\*, and \*\*\* indicate significance at the 10, 5 and 1 percent level, respectively.

Figure 1: Suicide Bombings and All Terror Attacks, 1993-2001

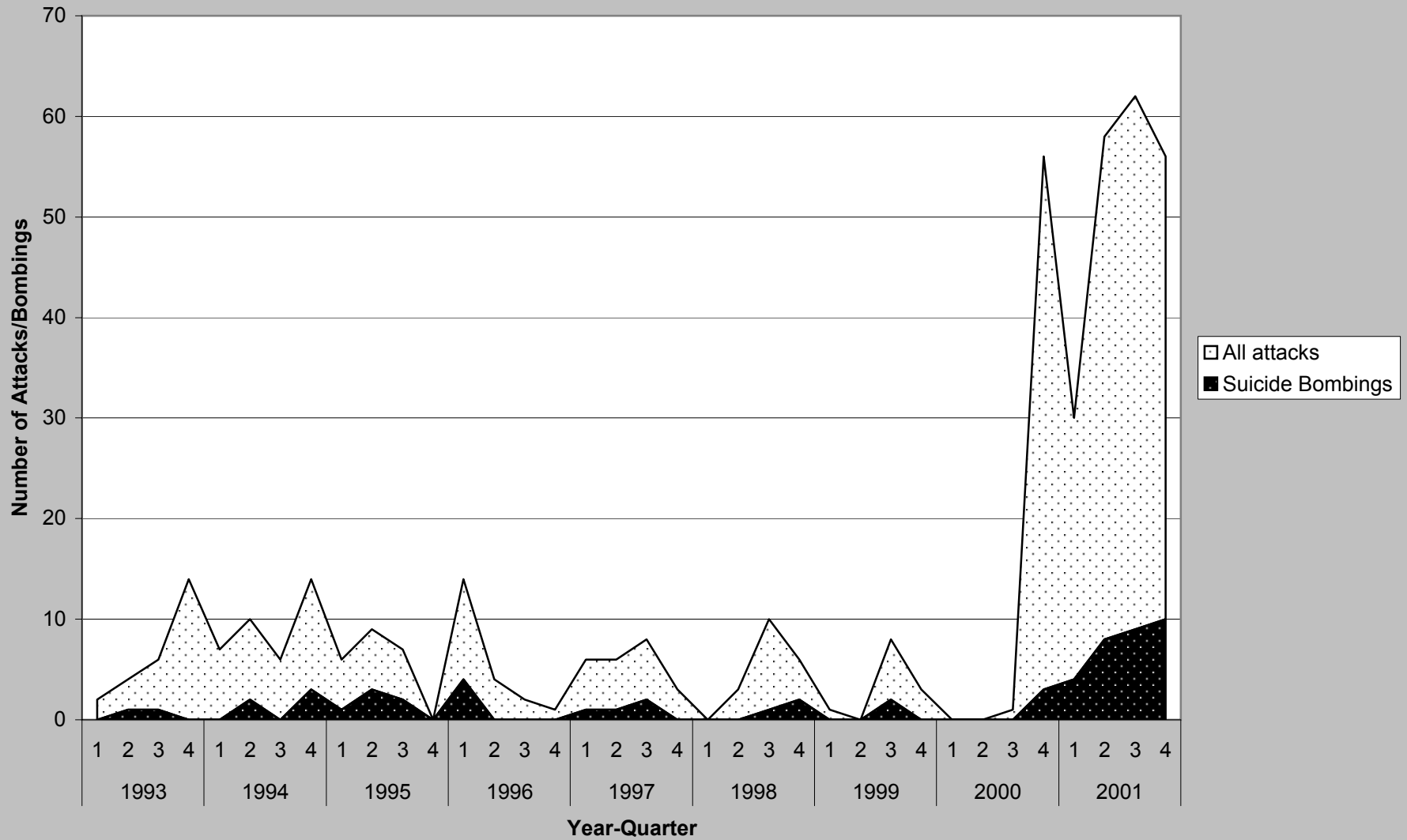


Figure 2: Unemployment rates in the West Bank and Gaza Strip, 1993 to 2001

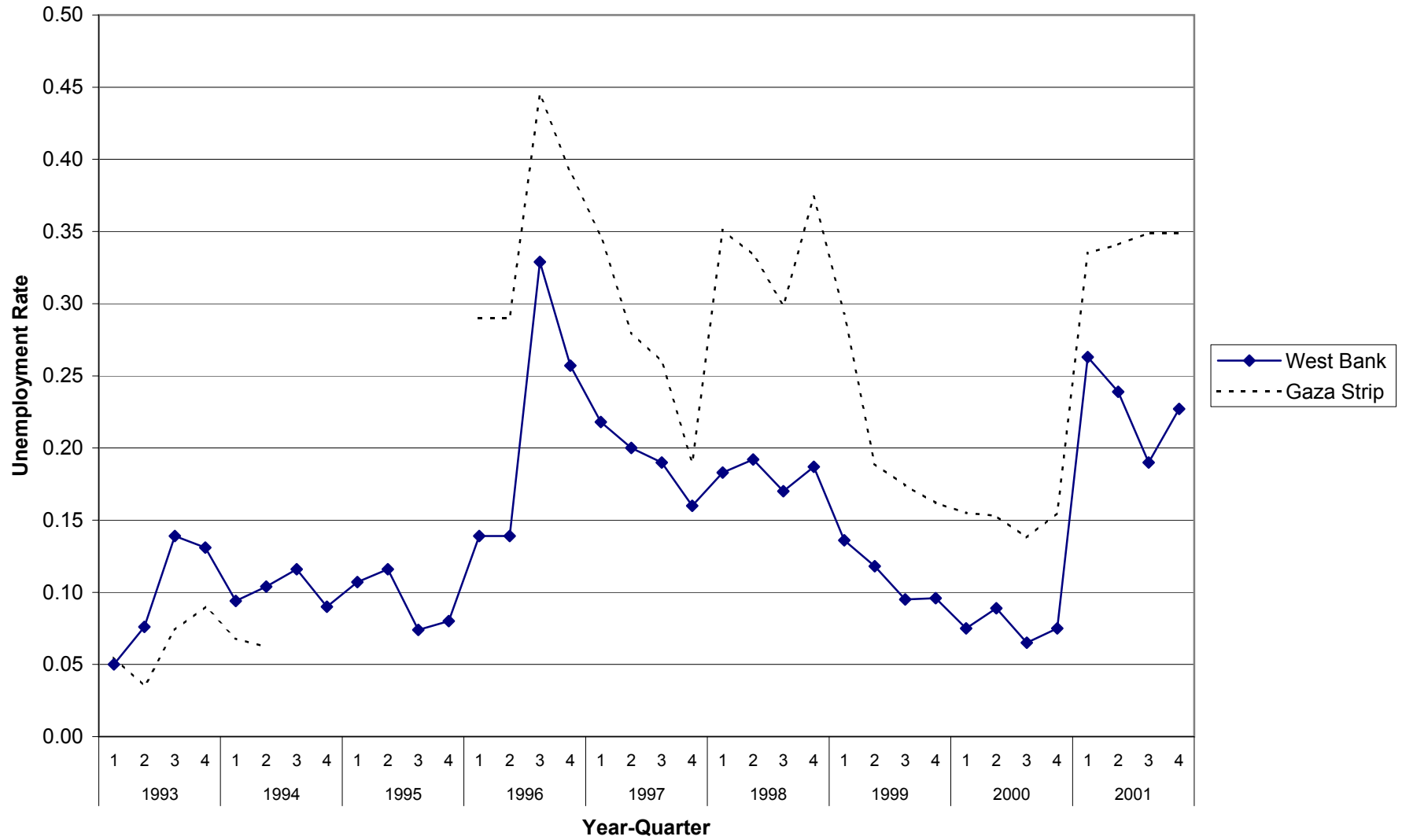


Figure 3: Real Wages (1995 NIS) for the West Bank and Gaza Strip 1993-2001

