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Lines in the Sand: Border Effects, Economic Integration and Disintegration of Post-War Iraq

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Abstract: Recent reports from Iraq paint a mixed picture of a country taking steps toward selfgovernance and economic recovery as well as one experiencing waves of violent internecine conflict. In this paper, we analyze weekly price data for 255 goods from the eighteen Iraqi governorates over the years 2005-2008 to assess the extent that markets are developing. The law of price one suggests that, after controlling for distance between major cities, prices should converge in the presence of relatively free trade among the governorates. Our model explores whether prices have converged across regions, over time and what might explain those dynamics. Our paper suggests four empirical regularities associated with market development in Post-War Iraq. First, the degree of price distortion (i.e. price dispersion) has been approximately two times higher than those reported using similar techniques and data in the United States and Japan. Second, the degree of price distortion drops significantly during the period commonly referred to as "the surge" and rises afterward, though at a more modest pace. Third, the degree of price distortion is significantly smaller in areas in which the United States military presence was greatest, i.e. Sunni and Kurdish regions as opposed to Shia regions. Finally, there is limited evidence to suggest that the sub-national economies (Kurdish, Shia, and Sunni) and not completely economically integrated, though the "border effects" are smaller than those reported across countries in the trade literature. Hence, we conclude there are "lines in the sand" rather than significant border impediments to trade. Taken together, these results suggest a significant role for violence and security in explaining market distortions and market integration and disintegration.

Keywords: Trade, Conflict, War

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1 Introduction

In the midst of ongoing Middle Eastern violence, scholarly debate about the economic costs of conflict often focuses on human capital losses, budget deficits, uncertainty costs, diplomatic costs, long-term security and rebuilding considerations, and many other direct and indirect costs.[2] An area that has received less attention, however, is the effect of violence on local market development and the prospects for economic integration within Iraq. We aim to provide such an analysis.

Using a rich data set from Iraq's eighteen governorates, we investigate the costs of market inefficiencies stemming from price volatility across intra-national borders. This paper considers the extent to which these price differences are driven by ethnic differences, patterns of violence, and lack of security. We are able to consider the extent of regional integration and disintegration during the period from June 2005 through March 2008, a span over which significant shifts in US and Iraqi security policy are evident. In particular, we consider the effect of the "surge" in 2007 and find (preliminary) evidence that US troop levels are negatively correlated with price dispersion—the more boots on the ground, the less economic friction across intra-national borders. Controlling for other factors, average price dispersion across the entire country appears to have declined by 11 percent from March 2007 to October 2007, when US troop levels associated with the surge peaked.[3] We also present (preliminary) results consistent with Iraq possessing artificial borders based on ethnic differences, though

[2] See, for example, Bilmes and Stiglitz (2008), Chaney (2008), Greenstone (2007), Foote, Block, Crane, and Gray (2004), and Nordhaus (2002), among others.
[3] Monthly US troop levels are tracked by the Brookings Institution in their comprehensive on-line reports: Iraq Watch (O'Hanlon and Campbell 2008).

these "lines in the sand" are smaller than what has previously been reported in the literature.

The underlying theory that motivates our analysis is the law of one price, which states that prices should equalize absent transportation costs. Testing this theory may already be considered a straw man. Engel and Rogers (1996), in their seminal paper "How Wide is the Border?" have shown that price dispersion appears to persist, even after transportation costs and other controls are introduced. Engel and Rogers use price data from a sample of US and Canadian cities to show how a simple political border can artificially affect market prices, revealing that a home bias can reduce the competition that firms in one country can expect from those in other countries.[4] The existence of this border effect has been confirmed in several other papers, including research by Baba (2004), who found that the border effect (between Japan and Korea in her case) could be partially explained by categorizing goods by their durability. Similarly, Parsley and Wei (2001) found that a border effect between Japan and the US can be explained in part by distance, unit-shipping costs, and exchange rate variability.[5]

Given the persistence of the border effect, some authors have chosen to explore the time patterns in price dispersion to explain why prices have not converged across countries over time. Bergin and Glick (2006), in a paper on global price dispersion, note that prices across major cities around the globe have alternately converged and diverged. They find a general U-shaped pattern with price dispersion first falling and then rising in

[4] More recently, Broda and Weinstein (2008) have revisited the debate about the width of the US-Canadian border, using a more detailed set of product codes from UPC data. They find lower levels of price dispersion when better controls for product differentiation are used.

[5] No model has fully explained the driving forces behind the border effect, leaving room for speculation about the role of country-specific, perhaps culturally driven home biases. However, Wolf (2000) demonstrated that even trade within one country, in his case the US, can be impeded by state borders. Hummels and Hillberry (2003) explain some of these intra-national home biases by the localization of wholesale activity.

recent years—a time variation that is difficult to explain in terms of the standard gravity equation variables common in the literature. They argue that oil price fluctuations and exchange rate volatility are the culprits, and that higher transportation costs are driving a wedge between global cities. Similar work on specific geographic regions, such as Europe, has also taken this approach. [6]

Still other authors have focused on explaining the sources of trade friction. Of particular relevance for our research are those who argue that violence is a potential barrier to trade.[7] Blomberg and Hess (2006) show that terrorism, as well as other forms of conflict, reduce international trade and may have effects equivalent to a 30 percent tariff. Blomberg and Mody (2005) show that domestic conflict and terrorism have a statistically significant adverse effect on international investment. Glick and Taylor (2005) do consider the direct effect of very large external wars on trade from a broader historical perspective and also find significant costs due to violence.[8]

In sum, most research on price dispersion has focused on countries marked by political stability and relatively steady economies, mainly because of data considerations. There are notable exceptions that find conflict can limit trade, though these papers concentrate on global trade and do not consider the special case of Iraq and its nascent market development. Moreover, prior research has largely ignored the importance of the possibility of artificial borders, such as those arising from ethnic or religious differences.

[6] Engel and Rogers (2004) and Bergin and Glick (2006) have each observed such a pattern for a set of European countries.

[7] A related area of research considers corruption as a trade barrier. Anderson and Marcouiller (2002) pursue this angle by focusing on corruption and imperfect contract enforcement as impediments to international trade. They find that omitting indexes of institutional quality obscures the negative relationship between per capita income and the share of total expenditure devoted to traded goods.

[8] Nitsch and Schumacher (2004) also analyze some aspects of conflict's impact on trade but over a significantly shorter time horizon. Martin, Mayer and Thoenig (2008) provide theoretical arguments on the relationship. Wolfers and Zitzewitz (2008) analyze the impact of conflict, particularly the Iraq War, on financial markets.

Our paper aims at filling these two gaps, with an empirical study of price dispersion in a country under considerable military and inter-ethnic stress.

The paper is organized as follows: to help provide an economic context to understand these stylized facts, in Section 2 we outline our baseline model that demonstrates the relationship between violence and price dispersion. In Section 3, we report the empirical regularities of our data. In Section 4, we provide the results from our estimation. The final section offers concluding remarks.

2 The Model

The gravity model has been the "workhorse" of empirical trade research and has, more recently, been used in the empirical foreign direct investment (FDI) literature. In its most basic form, the gravity equation postulates trade and financial flows increase with host and source country sizes and decrease with the distance between two countries.[9]

The following basic gravity model relates price dispersion between governorate pair *i,j* at time *t*:

$$(1) \quad D_{ij,t} = \alpha_0 + \alpha_1 Dis\tan ce_{ij} + \alpha_2 Border_{ij} + \sum \beta_i GOV_i + \sum \beta_j GOV_j + \sum_{t=20050601}^{20080401} \delta_t Week_t + \lambda V_{ij,t} + \varepsilon_{ij,t}$$

where *i* and *j* denote cities, *t* denotes time, and the variables are defined as:

$D_{ij,t}$ is the measure of price dispersion between cities *i* and *j*

Distance$_{it}$ is the log of (great circle) distance between the cities *i* and *j*

Border$_{ij}$ is a binary variable which is unity if *i* and *j* are in different quasi-

[9] Anderson (1979), Anderson and Van Wincoop (2003, 2004) suggest that the trade gravity model can be derived from a general equilibrium analysis of global trade. Carr, Markusen, and Maskus (2001a, b) and Blonigen, Davies, and Head (2001) lay the groundwork to support a "modified" FDI gravity model.

countries (i.e. Kurdish, Shia, and Sunni) that share a land border

$V_{ij,t}$ is a measure of organized violence. We construct a joint measure(s) of violence across each governorate pair over time.

GOV_i and $Week_t$ are governorate and time dummy variables

α_i, β_i, δ_t, *and* λ_i are coefficients; and

$\varepsilon_{ij,t}$ represents other influences on price dispersion, assumed to be well behaved.

Note that different modifications of the regression include dyad (governorate by product) fixed effects and year fixed effects to capture factors that may affect the dispersion in prices between cities that are not otherwise in the list of regressors.

The border variable may also be expanded to address common religious "borders" and common ethnic "borders." Our hypothesis is that the coefficient associated with the border will be positive, so that the degree of price distortions will be smaller within quasi-countries. Or, when we employ a quasi-country specific dummy, our hypothesis will be that Kurdish, Shia, or Sunni dummy variables will enter negatively: they will reduce price dispersion within each quasi-country. Because of our week and governorate fixed effects, the violence measure is defined across governorate pairs and varies over time. We anticipate that this variable will enter positively: violence will increase price dispersion. (Conversely, a security variable, such as "the surge", would enter negatively.)

3 Data

In this section, we describe the data employed in our analysis and begin by investigating its statistical properties. Our approach will examine differences in security and safety between different governorates within Iraq. We aim to examine how short-

term violence within an established economy affects market prices and economic stability. Using unbalanced data set on market prices from 2005 to 2008, of 255 goods over 18 different governorates, and controlling for distance between the governorates and other exogenous factors, we hope to quantify the market inefficiencies that result from a lack of security and safety, as well as from ethnic divisions. In particular, by considering various time dimensions in the data, we are better able to investigate the importance of policy shifts, such as the "surge" of 2007, for the economic stabilization and integration of the Iraqi economy.

Price Data for Iraq

In our analysis we use data on actual price levels, not price indexes. The data are obtained from the ANKA Company, which records local prices for over 255 individual goods and services in 18 governorates. The goods are narrowly defined, such as benzene (1 kg) and eggs (fresh-local, dozen). For goods in the survey, prices are sampled from the major city of each governorate. The data are available weekly from June 2005 to May 2008. All prices are recorded in local currency and converted to price per kilogram for comparison. Tables 5A-5B list the major product groups with the associated violence levels and price dispersion and Tables 1A-1B, 3A-3B, 7A-7B list the governorates included.

There are potentially 171 governorate pairs (153 = 18 x 18/2), each with up to 145 weekly observations. Thus, the sample consists of a maximum of roughly 23,000 observations of price dispersion among governorate pairs for each of the 255 goods. This creates the dyad (product by governorate) panel structure of our data set. However, as many products are sampled in fewer weeks and governorates, the size of

the data sample is smaller. On average, each product has approximately a little more than one year of data and is compared across 1/3 of the governorates. Once we eliminate duplicate observations (i.e. eliminating one of product *i* in governorate *k* vs. governorate *j,* and product *i* in governorate *j* vs. governorate *k*), we are left with 681,465 observations for our regression analysis. We then merged these observations to a dataset that contained information on politics, economics, geography, culture and security for these same governorates during these same time periods.[10] Hence, with the number of variables included in the analysis, we still needed a "super computer" to conduct the majority of the estimation.

To create our measure of price dispersion, we take the natural log of the price ratio $\ln(P_{i,t}^k / P_{j,t}^k)$ for a given product between each governorate pair. We define the price differential as the absolute value of the difference between the two log prices: $D_{ij,t}^k = \left| p_{i,t}^k - p_{j,t}^k \right|$. There are a myriad of measures employed in the literature, but none of the major results are sensitive to our data transformation.

Our summary measure of average price dispersion is constructed from the average price differential across all products for a given governorate pair in a given week: $\overline{D}_{ij,t} = \sum_{k \in K} \left| d_{ij,t}^k \right| / K_T$. This is the measure reported and described in detail in our summary graphs discussed below in section 4.

Security Data

[10]Though other variables are included in the regressions, we concentrate our main discussion on the price and security data.

The potential data on security is immense. There are political data sets involving security and stability statistics from the U.S. Department of Defense (see U.S. Department of Defense 2008); energy consumption and production data for the Special Inspector General for Iraqi Reconstruction; demand, supply, prices, and trends in energy goods (such as gas turbines, thermal energy sources, hydro energy sources, and energy imports) from the U.S. State Department's Iraq Reconstruction and Management Office; Coalition casualty data from U.S. Department of Defense; and Iraqi casualty data from various on-line sources. The Brookings Institution Iraq Index (O'Hanlon and Campbell 2008) compiles comprehensive data on these topics, as well as several economic indicators that will facilitate welfare calculations and our ultimate discussion of the real costs of war.

In the end, due to the degree of multicolinearity associated with each of these sources, we opted for measuring security using three data methods. First, we employ Coalition casualty data from the U.S. Department of Defense as given by the website http://icasualties.org/. The data reports the actual number of United States and Coalition casualties by region from 2003 to the present. We aggregate all deaths by week in each governorate so we have a measure of the defensive posture during our time sample. Second, we employ Iraqi casualty data for the Iraqi Security Force (ISF) from the same website http://icasualties.org/. The data again reports the actual number of ISF casualties by region from 2003 to the present. We aggregate all deaths by week in each governorate so we have measure of the defensive posture during the period in question. The data allow us to differentiate security derived from coalition (primarily United States casualties) and security derived from domestic forces. Third, we employ the time period

known as “the surge”, i.e. March 20, 2007 when troop strength is increased to 152,000 to November 24, 2007 when the surge was effectively declared over.[11] On January 10, 2007, President Bush announced these changes in the military strategy in Iraq. "America will change our strategy to help the Iraqis carry out their campaign to put down sectarian violence and bring security to the people of Baghdad. This will require increasing American force levels.”

Though not perfect, our third security measure, “the surge”, allows us to better control for the obvious endogeneity problem associated with the first two measures. The first two measures which rely on casualty data may increase during periods in which there are more troops on the ground, independent of the level of “security”. The third measure is a *policy* change that begins after the data was sampled and ends before the data has been completely sampled. The third measure is a policy change that may also have different impacts in different regions, as the surge was directed as explained above, disproportionately in certain regions, e.g. Baghdad.

4 The Results

Preliminary Data Analysis

We begin this section with a preliminary examination of the data to assess the extent to which security and price distortions have changed in Iraq in the various regions during the time 2005 to 2008. We examine the summary statistics for United States casualties, ISF casualties, and price distortions across different products, different regions, during three time periods: pre-surge, during the surge, and post-surge. In

[11] See http://www.whitehouse.gov/news/releases/2007/01/20070110-7.html.

summary, we find that Iraqi casualties have fallen in most areas since the surge was initiated. We find that United States casualties rose during the surge and fell subsequently in most regions. Most importantly for this study, we find the impact of the surge caused the level of price dispersion to fall by as much as 9 percentage points in some regions. The impact was significantly smaller in other regions, causing the average level of price dispersion to decline by 2 percentage points during the surge. Hence, on an impressionistic level, there appears to be a significant impact of security on market performance, particularly in Sunni and Kurdish regions.

Tables 1A-1B report the summary statistics for Iraqi fatalities in each governorate over the different policy periods. The first column denotes the governorate being investigated. The second column (labeled 1) provides the mean number of fatalities per week, the third column (labeled 2) provides the median number of fatalities per week, and the fourth column (labeled 3) provides the total number of fatalities. The last column (labeled 4) provides the number of times there are fatalities in a governorate, week. We also provide the results from tests that the surge and post-surge means are statistically significant from the pre-surge mean. Statistical significance is highlighted by *'s in which one * signifies significance at the 0.10 level, ** denotes significance at the 0.05 level and *** denotes significance at the 0.01 level.

Tables 1A-1B show that on average 4.27 Iraqi soldiers died per week. The average number of deaths per week were higher before the surge was initiated (4.91) than during the surge (3.43). That number remained lower even after the surge (2.79). The degree of heterogeneity in fatalities appears to be quite high, as some regions such as Baghdad had 1,973 casualties whereas others such as Maysan experienced only 3. For

highly violent regions such as Baghdad, ISF casualties dropped from 15 to 8.85 to 3.75 during the pre-surge to surge to post-surge time periods.

Table 2 examines the exact same data though it is parsed by quasi-country.[12] The table is organized analogously to Table 1A-1B. Table 2 shows that fatalities have fallen during and after the surge, though there appears to be less of a dramatic change in Shia regions. One interpretation of this is that the surge was directed at regions other than the Shia area. Therefore, one might not expect the same change in security in Shia regions.

Tables 3A-3B and Table 4 report the summary statistics for United States and other Coalition fatalities in each governorate and quasi-country over the different policy periods. The table is organized analogously to Table 1A-1B and Table 2. Tables 3A-3B show that on average 1.55 Coalition soldiers died per week. The average number of deaths per week was higher during the surge (1.88) than before the surge (1.6). That number was lower after the surge (0.88). Once again, the degree of heterogeneity in fatalities appears to be quite high as some regions such as Baghdad averaged 5.18 deaths a week while others such as Sulyamanniyah had no fatalities during our time sample. For high violent regions such as Baghdad, coalition casualties more than doubled from 4.33 to 9.18 during the surge. The number of casualties has since fallen to 3.42 during the post-surge time periods.

Table 4 examines the exact same data though it is parsed by quasi-country.[13] Table 4 shows that fatalities did increase during the surge and fell subsequently

[12] Quasi-country is defined to be Kurdish, Shia, and Sunni commonly reported from sources such as Wikipedia. See the bottom of the tables for exact definition. There is some variation in the governorate ethnic mix over time, however changing the definition does little to change the results.

[13] Quasi-country is defined to be Kurdish, Shia, and Sunni commonly reported from sources such as Wikipedia. Sunni: Anbar, Babil, Baghdad, Diyala, Ninawa, Salah ad Din. Shia: Basrah, Dhi Qar, Karbala, Maysan, Muthana, Najaf, Qadisiyyah, Wasit. Kurdish: Arbil, Dahuk, Kirkuk, Sulaymayyah. There is some

afterward, though there appears to be less of a dramatic change in Shia regions. Once again, one interpretation of this is that the surge was directed at regions other than the Shia area.

Tables 5A-5B through Table 8 present the summary statistics for our Iraqi price data. The first column denotes the product-type, governorate or quasi-country being investigated. The second column (labeled 1) provides the mean degree of price dispersion, the third column (labeled 2) provides the median degree of price dispersion, and the fourth column (labeled 3) minimum degree of price dispersion and the fifth column (labeled 4) denotes the maximum degree of price dispersion. The last column (labeled 5) provides the number of times there are samples in a governorate, week. We also provide the results from tests that the surge and post-surge means are statistically significant from the pre-surge mean. Statistical significance is highlighted by *'s in which one * signifies significance at the 0.10 level, ** denotes significance at the 0.05 level and *** denotes significance at the 0.01 level.

Tables 5A-5B reveal considerable differences across product groups within Iraq. Various fuels and specific cheese products show high levels of inter-governorate price dispersion. Other food staples show more moderate levels of price dispersion.[14] On average, the inter-governorate price dispersion within most product groups decline from the pre-surge period to the surge period. Tables 7A-7B show the price dispersion experienced by each governorate relative to the rest of the country. Maysan, a governorate in the eastern part of Iraq that borders Iran, shows the highest levels of price

variation in the governorate ethnic mix over time, however changing the definition does little to change the results.

[14] Careful reading of the data in these tables show that some minimum prices do not appear to change over time (pre-surge and post-surge periods). This suggests possible price controls, which we need to examine in greater depth.

dispersion—meaning its average price, across all products, exhibits the largest differential relative the average price prevailing in other governorates.

Table 7A-7B also shows that average price dispersion for the entire period is 0.23, which translates into an average price ratio between major Iraqi cities of 1.23. (To back out the average price ratio at a given point in time, one needs to apply the exponential function to the price dispersion measure.) At first glance, this estimate might seem low, especially since studies of price dispersion between industrialized countries usually find slightly higher levels. Several explanations are possible. First, the lower level of economic development may act to decrease price dispersion (through lower levels of product differentiation, lower levels of industrial concentration and market power, and through lower levels of income, among others). Second, Iraq's isolation over the twelve years preceding Operation Iraqi Freedom may have strengthened internal economic cohesion, making Iraq a more integrated economy than a typical small open economy. Future research might fruitfully address price dispersion within developing countries over time to give a better benchmark for developing country studies.

However, when compared with estimates that include only within country variation, our estimates may seem more plausible. In a recent working paper "Deviations from the Law of One Price in Japan", Cheung and Fujii employ our price dispersion measure and find price dispersion to be approximately one half of our estimate at 0.l2. Obviously Japan is a more developed country so it is not a perfect benchmark, but at least it examines only within country price dispersion.[15]

[15] Japan is actually slightly smaller than Iraq [438317 km^3 to 377873km^3] though it has 3 times the population at 127 million and over 10 times the income per person at $38,000.

Using the same measure, Broda and Weinstein (2008) find degrees of dispersion for US - US and Canada - Canada, to be about 0.22 and 0.187 respectively. Of course, both the United States and Canada are considerably larger than Iraq. They use the standard deviation measure as well. They emphasize that aggregating prices (through price indices and possibly through product group means) considerably increases price dispersion measures, when compared with individual product-level means.

Tables 7A-7B and 8 also show the results from our initial coding of governorate and quasi-country by majority ethnic-religious population. For example, it shows the average price dispersion of majority Shiite governorates, such as Najaf, relative to all non-Shiite governorates. It measures the integration of particular ethnic-religious groups with those outside their group. There is a systematic change in the degree of price dispersion during and after the surge. The degree of price dispersion is lower in every region but two during the surge (Maysan and Qadisayyah) and subsequently increases in every region but three (Dahuk, Qadisayyah and Sulaymaniyyah). Table 8 shows that the drop in price dispersion is was less likely to occur in Shia regions which is not surprising given that both Maysan and Qadisayyah are predominantly Shia.

Figures 1 through 6 present our summary statistics on average price dispersion, cut along various dimensions of the data.[16] Figure 1 depicts average weekly price dispersion across all the governorates of Iraq. The timing of the surge is indicated by the vertical red lines. This figure gives a preliminary idea of how major shifts in security policy are correlated with price dispersion in Iraq as a whole. Of particular interest, the

[16] Recall that we define price dispersion across cities as the absolute value of the deviation of relative (logs of) prices. Separately, we have also considered the mean squared error (*MSE*) of relative (logs of) prices. There is little qualitative difference in the measures.

overall level of national price dispersion appears to decline from its peak in late 2006 through late 2007, when it begins another upward climb. To give an idea of the economic importance of this trend: in late November 2006, the average price ratio was 1.274; by October 2007, it decline to 1.200. This translates into a decrease of approximately 5.8 percent in national price dispersion.

Figure 2 depicts the weekly differences in average price dispersion for three selected governorates, and it highlights two additional features of the data. First, the decline in price dispersion appears for each of these three governorates, suggesting that it was a relatively broad phenomenon and not driven by lower price dispersion in a few governorates only. Second, most of 2007 is marked by a convergence in the level of price dispersion across the three governorates depicted here. The average level of price dispersion experienced by these governorates becomes much more similar during this period. That convergence ends somewhat abruptly in late 2007.

Figure 3 depicts the weekly differences in average price dispersion for the three quasi-countries of Iraq: the Kurdish north, the Sunni middle, and the Shiite south. The upward slope common across all three quasi-countries from late 2005 to late 2006 suggests the economic friction between the three predominate groups was growing over this period. In 2007, their experiences diverge somewhat: the Sunni middle sees a notable decline in average price dispersion—it seems better integrated with non-Sunni areas; the Kurdish north experiences a modest decline in average price dispersion; and the Shiite south sees relatively little change in average price dispersion.

Figures 4A – 6B present analogous summary statistics for Iraqi and coalition casualties during our data sample. Figures 4A – 4B depicts average weekly Iraqi and

coalition fatalities across all the governorates of Iraq. Once again, the timing of the surge is indicated by the vertical red lines. The data for fatalities is significantly "noisier" than the data for price dispersion as violence may be very high with over 100 Iraqi casualties in a week or low with 10 Iraqi casualties in a week. With respect to the impact of the surge, "ocular" tests suggest that the surge may have had limited impact on Iraqi casualties, but most certainly increased coalition casualties. During the post-surge sample, it appears that fatalities are lower for both the ISF and coalition forces.

Figures 5A – 5B depicts the weekly differences in fatalities for the same three selected governorates, and it highlights two additional features of the data. First, there is significant variation in violence as Baghdad has many more ISF and coalition fatalities than Anbar or Kirkuk. Second, during the post-surge sample, violence declines in each of the governorates.

Figures 6A-6B depicts the weekly differences in ISF and coalition forces fatalities for the three quasi-countries of Iraq: the Kurdish north, the Sunni middle, and the Shiite south. Once again, the main feature seen in the figure is the significant difference in violence of Sunni regions as opposed to Kurdish or Shia regions.

Finally, Figures 7 - 9 offer a preliminary heat map of pre- and post-surge average price dispersion, and violence by governorate. Figure 7 shows that for most governorates, the country's economic frictions appear to "cool" in the post-surge period. One interesting outcome is the tendency for countries bordering Iran to experience relatively high price dispersion even after the surge. One early conjecture is that these provinces were subject to stricter internal border controls because of the possible threat of

anti-Coalition and anti-Iraq militants from Iran entering through these regions. During the Post-surge era, the economic frictions appear to warm again.

Figures 8 – 9 offer a preliminary heat map of pre- and post-surge violence by governorate. Figures 8 – 9 show that for most governorates, there is a slight "cooling"-off period during the post-surge period compared to the pre-surge period. If anything, the surge itself appears to warm tensions using either measure of violence.

Taken together, Tables 1 – 8 and Figures 1 – 9 provide an interesting picture of Post-War Iraq. Waves of violence have erupted with particular force in specific regions. To address this, the military experimented with increasing the troop levels during the period commonly referred to as "the surge". While it may be difficult to gauge the impact of the experiment on moving Iraq toward or away from a blossoming emerging market economy, there appear to be impacts on market prices – at least at the impressionistic level. It appears that the surge has allowed price dispersion to shrink across most regions of Iraq during the surge. However, some areas that are more populated by Shia did not see as significant an impact, and part of the impact has been reversed during the post-surge period. In the section below, we attempt to control for other possible explanations for the dynamics of price dispersion to see how robust these preliminary findings really are.

Regression Results

Our regression results allow us to control for other possible correlates. Our city and week fixed effects will reduce the potential heterogeneity affecting the summary statistics. Our distance measure is a proxy for raw transportation cost. For example, the relatively low price dispersion experienced by the Baghdad governorate arises, in part,

because of its central location and its hub of transportation networks. The explanatory variables of primary interest are the border controls and security controls. Our hypothesis is that shared borders—whether land borders, religious borders, or ethnic borders—will reduce price dispersion, as transactions effected across these shared characteristics will experience less conflict and intra-governorate friction. We expect our security measures to show that improved security facilitates inter-governorate trade and contributes to greater price convergence. We also hope to identify the timing of policy shifts more carefully and discuss their effects through the use of period dummies.

Table 9 reports the results from our model estimation of equation (1). The column on the far left denotes the coefficient associated with each variable in the regression. Column 1 reports the simple OLS estimates of the impact of SURGE and POSTSURGE. Column 2 includes the impact from quasi-standard gravity models such as: DISTANCE, BORDER, ethno-linguistic fractionalization (ETHNOFRAC)[17], fatalities from US and ISF troops [FATALITIES(US)[18], FATALITIES(ISF)], goods that are imported (IMPORTS) and goods that are imported from the Middle East (MIDEAST IMPORTS). Column 3 provides the results from an estimation that converts the BORDER dummy into each quasi-country (KURDISH, SHIA, SUNNI) to estimate the home bias within each quasi-country. Column 4 provides the results when we interact these quasi-country dummies with SURGE and POSTSURGE. Columns 5 – 8 employ the estimation in Column 4 including country fixed effects (CFE), time fixed effects

[17]ETHNOFRAC is a Hirschman Herfandahl Index (H.H.I.) given as the average sum of squared percent of each ethnic group pair with 0 meaning no concentration and 1 meaning one homogenous pair in each governorate dyad.

[18]The vast majority of fatalities were United States fatalities. If one employs coalition fatalities instead, the results are qualitatively similar.

(TFE), dyad governorate good fixed effects (DFE) and time and dyad fixed effects (DTFE). In each regression, the standard errors are clustered by dyad.

The results shown in Table 9 are consistent with the results typically associated with the gravity equation/law of price one literature. Column 2 shows that both BORDER and DISTANCE increase price dispersion. Goods that are imported outside of Iraq (IMPORTS) increase price dispersion, though goods imported from other Middle Eastern countries (MIDEAST IMPORTS) decrease relative price dispersion. We can also estimate the width of the BORDER using the estimates from Column 2 to reveal that even though there is a significant statistical effect from borders, the economic significance is not a huge impediment to trade. In this case, we estimate the border to be as wide as 1.5 kilometers or about 1 mile.[19] This is what we refer to as a "line in the sand".

Table 9 also reports the results from examining the impact of ethnic/religious/cultural borders. In Column 2, we include a measure of ethnic fractionalization (ETHNOFRAC) to show goods compared across two more homogeneous populations tend to have greater dispersion than those across more heterogenous ones. One might predict this effect is merely proxying the effect of the home bias between two homogenous countries. In other words, governorates with highly homogenous populations of Sunni for example (say Salah ad Din with estimated 90 percent Sunni) may be less willing to trade with governorates with highly homogenous populations of Shia for example (say Dhi Qar with estimated 100 percent Shia).

Column 3 considers this possibility by reformatting the BORDER dummy into quasi-country specific borders (i.e. KURDISH, SHIA, SUNNI). The coefficient

[19] This is obtained by calculating $\exp(\alpha_2/\alpha_1)$.

associated with these borders captures the extent to which home bias trade, e.g. KURDISH to KURDISH trade, impacts price dispersion. As one might expect, own-country trade in KURDISH and SUNNI governorates decreases the degree of price dispersion by approximately 3 percentage points. However, own country trade in SHIA governorates actually leads to a slightly higher degree of price dispersion of approximately 1 percentage point. We attempt to explain this difference by considering the impact of security on trade.

To see this, we begin by examining the results from our first column. Column 1 reports the simple change in mean price dispersion when comparing the sample during and after the SURGE. In the very simple case, mean price dispersion fell by 2 percentage points during the surge and remained slightly lower in the POSTSURGE period. Column 2 shows that the addition of standard covariates do little to impact these estimates, though the impact from our other security variables are not terribly statistically informative. This should not be surprising given the data on security is quite "noisy". Increases in the number of casualties cause mean price dispersion to fall, which may suggest that the greater military presence associated with more casualties lowers price dispersion.[20] However, the impact is relatively miniscule. A 66 percent increase of weekly United States casualties from 1.5 to 2.5 will decrease price dispersion by less than 1/10 of 1 percentage point.

Column 4 pursues the question of the impact of security more deeply by dividing the impact of SURGE and POSTSURGE into each quasi-country. In this case, we continue to see a similar decrease in average price dispersion during the SURGE (2.3 percentage points) and during the POSTSURGE (1.3 percentage points). Interestingly,

[20] Of course it could also mean that violence has a perverse impact of lowering price dispersion.

we notice that, during the surge, price dispersion fell more rapidly in populations with relatively more SUNNI (3.1 percentage point decline) and KURDISH (1.3 percentage point decline) but rose more rapidly in populations with relatively more SHIA (3.3 percentage point increase). Moreover, during the POSTSURGE period, the impacts persisted as price dispersion continued to fall more rapidly in populations with relatively more SUNNI (0.1 percentage point decline) and KURDISH (0.9 percentage point decline) but continued to rise more rapidly in populations with relatively more SHIA (3.3 percentage point increase). These results are consistent with the average effect of home bias which continued to show own country trade in KURDISH and SUNNI governorates decreases the degree of price dispersion by as much as 3 percentage points. Own country trade in SHIA governorates also decreases price dispersion but to a lesser extent.

The remaining columns in Table 9 are various specifications of the model estimated in Column 4 to see to what extent country (Column 5), time (Column 6), dyad (Column 7) and dyad/time (Column 8) are driving the results. The results are largely robust across each of these estimation schemes. Interestingly, the final column which attempts to control for the most factors demonstrates the largest increases in the magnitude of these effects. Column 8 shows that once we control for all these factors, average price dispersion falls by 11 percentage points during the surge and 8.5 percentage points afterward. Comparing goods within own-country governorates with the highest levels of SUNNI or KURDISH shows an additional 2 to 3 percentage point decline during the surge with little change afterward. Comparing goods within own-country governorates with the highest levels of SHIA paints a different picture. In this case, own-

SHIA governorates show a 3 percentage point increase during the surge with a persistent 2.5 percentage point increase afterward.

Tables 10A-10B continue the exercise by examining the model estimated in the final column of Table 9 across each product-type. For the most part, the results shown in Table 9 are seen in Tables 10A-10B. There are some notable results. In column 2, we consider the impact of FUEL which is a non-tradable and may be therefore sensitive to enhanced security measures. In this case, we notice that the degree of price dispersion falls by a remarkable 35 percentage points during the surge and sees a persistent decline of 13 percentage points afterward.[21] However, other products also see remarkable declines that have little to do with transportation costs (such as Maize, Tomato Paste, and Fish). While the change in price dispersion for Maize may be driven by other market dynamics like the recent increase in commodity prices, it is hard to understand why other commodities have had such large impacts such as Tomato Paste and Fish.

Tables 11A-11B continue the exercise by examining the model estimated in the final column of Table 9 across each governorate. Once again, for the most part, the results shown in Table 9 are seen in Tables 11A-11B. In most cases, the surge led to a statistically significant decline in price dispersion in either the governorate or in own-country trade for the governorate. Notable exceptions are Basrah, Dhi Qar, Karbala, Maysan, Muthana, Najaf, and Qadisiyyah which each have relatively larger populations of SHIA.

Our final round of robustness checks are shown in Table 12 which examines the model estimated in the final column of Table 9 across other specifications to include

coarser groups for region (quasi-country) and good-type (e.g. tradables). All of the qualitative results continue to hold.

5 Conclusions

This paper employs a novel dataset to test the impact of violence on the law of one price. We analyze weekly price data for 255 goods from the eighteen Iraqi governorates over the years 2005-2008 to assess the extent to which security measures such as "the surge" have impacted measures of price distortion. Our paper posits there are four empirical regularities associated with market development in Post-War Iraq. First, the degree of price distortion (i.e. price dispersion) has on average been 24 percent across all governorates during the time in question. Second, ceteris paribus, price distortion drops significantly during the "the surge" by as much as 11 percentage points and rises slightly afterward. Third, the degree of price distortion is significantly smaller in areas in which the United States military presence was greatest, i.e. Sunni and Kurdish regions as opposed to Shia regions. Finally, there is limited evidence to suggest that the sub-national economies (Kurdish, Shia, and Sunni) are not completely economically integrated, though the "border effects" are smaller than those reported across countries in the trade literature. Hence, we conclude there are "lines in the sand" rather than significant border impediments to trade. Taken together, these results suggest a significant role for violence and security in explaining market distortions and market integration and disintegration.

There are obvious other possible explanations for the dynamics of price distortions in Post-War Iraq. During the same time in question, there have been significant developments in commodity markets, oil markets, and regional security in

areas such as Israel, Iran, Lebanon and Palestine. We have attempted to control for these differences by considering factors idiosyncratic to product, region, security, and time. Still, we understand that it may be impossible to consider some of these alternative explanations. We believe we have provided some evidence on how important security is on developing markets with particular emphasis on Post-War Iraq.

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Table 1A: Weekly Iraqi Fatalities, Pre- & Post- Surge by Governorate 2005 - 2008:5

		1 Mean	2 Median	3 Sum	4 Observations
Anbar	Fatalities	3.51	2	523	149
	Fatalities(Pre-surge)	4.07	3	403	99
	Fatalities(surge)	2.34**	1	75	32
	Fatalities(Post-surge)	2.5	.5	45	18
Arbil	Fatalities	3.64	0	40	11
	Fatalities(Pre-surge)	10	.5	40	4
	Fatalities(surge)	0	0	0	2
	Fatalities(Post-surge)	0	0	0	5
Babil	Fatalities	3.01	1	434	144
	Fatalities(Pre-surge)	3.12	1	284	91
	Fatalities(surge)	3.27	2	108	33
	Fatalities(Post-surge)	2.1	1	42	20
Baghdad	Fatalities	12.1	10	1973	163
	Fatalities(Pre-surge)	15	12	1591	106
	Fatalities(surge)	8.85***	7	292	33
	Fatalities(Post-surge)	3.75***	1.5	90	24
Basrah	Fatalities	.809	0	89	110
	Fatalities(Pre-surge)	.779	0	53	68
	Fatalities(surge)	.5	0	12	24
	Fatalities(Post-surge)	1.33	0	24	18
Dahuk	Fatalities	3	3	9	3
	Fatalities(Pre-surge)	3	3	6	2
	Fatalities(surge)	3	3	3	1
	Fatalities(Post-surge)	.	.	0	0
Dhi Qar	Fatalities	.333	0	6	18
	Fatalities(Pre-surge)	0	0	0	10
	Fatalities(surge)	1*	0	6	6
	Fatalities(Post-surge)	0	0	0	2
Diyala	Fatalities	5.46	4	847	155
	Fatalities(Pre-surge)	5.85	4	579	99
	Fatalities(surge)	5.24	3	173	33
	Fatalities(Post-surge)	4.13	3	95	23
Karbala	Fatalities	1.16	0	57	49
	Fatalities(Pre-surge)	1.21	0	46	38
	Fatalities(surge)	.667	0	4	6
	Fatalities(Post-surge)	1.4	2	7	5
Kirkuk	Fatalities	2.91	2	442	152
	Fatalities(Pre-surge)	3.61	2	350	97
	Fatalities(surge)	1.88***	2	62	33
	Fatalities(Post-surge)	1.36***	1	30	22

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean number of ISF Fatalities per week in each governorate. Column 2 lists the median and Column 3 lists the total number summed over each governorate. Column 4 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:3. Surge refers to the time period 2007:3 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5.

Table 1B: Weekly Iraqi Fatalities, Pre- & Post- Surge by Governorate 2005 - 2008:5

		1 Mean	2 Median	3 Sum	4 Observations
Maysan	Fatalities	.214	0	3	14
	Fatalities(Pre-surge)	0	0	0	8
	Fatalities(surge)	.25	0	1	4
	Fatalities(Post-surge)	1	1	2	2
Muthanna	Fatalities	1.08	0	27	25
	Fatalities(Pre-surge)	1.06	0	19	18
	Fatalities(surge)	1.2	0	6	5
	Fatalities(Post-surge)	1	1	2	2
Najaf	Fatalities	.786	0	33	42
	Fatalities(Pre-surge)	1.08	0	27	25
	Fatalities(surge)	.417	0	5	12
	Fatalities(Post-surge)	.2	0	1	5
Ninawa	Fatalities	4.65	4	726	156
	Fatalities(Pre-surge)	4.62	3	457	99
	Fatalities(surge)	4.06	3	134	33
	Fatalities(Post-surge)	5.63	5	135	24
Qadisiyyah	Fatalities	1.38	0	106	77
	Fatalities(Pre-surge)	1.53	0	69	45
	Fatalities(surge)	1.43	0	33	23
	Fatalities(Post-surge)	.444	0	4	9
Salah ad Din	Fatalities	6.97	5	1102	158
	Fatalities(Pre-surge)	7.45	6	752	101
	Fatalities(surge)	7.15	6	236	33
	Fatalities(Post-surge)	4.75**	2	114	24
Sulaymaniyyah	Fatalities	.364	0	4	11
	Fatalities(Pre-surge)	.5	0	4	8
	Fatalities(surge)	0	0	0	1
	Fatalities(Post-surge)	0	0	0	2
Wasit	Fatalities	.929	0	78	84
	Fatalities(Pre-surge)	.932	0	41	44
	Fatalities(surge)	.862	1	25	29
	Fatalities(Post-surge)	1.09	1	12	11
Total	Fatalities	4.27	2	6499	1521
	Fatalities(Pre-surge)	4.91	2	4721	962
	Fatalities(surge)	3.43***	1	1175	343
	Fatalities(Post-surge)	2.79***	1	603	216

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean number of ISF Fatalities per week in each governorate. Column 2 lists the median and Column 3 lists the total number summed over each governorate. Column 4 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:3. Surge refers to the time period 2007:3 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5.

Table 2: Weekly Iraqi Fatalities, Pre- & Post- Surge by Quasi-Country 2005 - 2008:5

		1 Mean	2 Median	3 Sum	4 Observations
Kurdish	Fatalities	2.800	2	495	177
	Fatalities(Pre-surge)	3.600	2	400	111
	Fatalities(surge)	1.760**	2	65	37
	Fatalities(Post-surge)	1.030***	0	30	29
Shia	Fatalities	0.952	0	399	419
	Fatalities(Pre-surge)	0.996	0	255	256
	Fatalities(surge)	0.844	0	92	109
	Fatalities(Post-surge)	0.963	0	52	54
Sunni	Fatalities	6.060	4	5605	925
	Fatalities(Pre-surge)	6.830	4	4066	595
	Fatalities(surge)	5.170***	3	1018	197
	Fatalities(Post-surge)	3.920***	2	521	133
Total	Fatalities	4.270	2	6499	1521
	Fatalities(Pre-surge)	4.910	2	4721	962
	Fatalities(surge)	3.430***	1	1175	343
	Fatalities(Post-surge)	2.790***	1	603	216

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean number of ISF Fatalities per week in each governorate. Column 2 lists the median and Column 3 lists the total number summed over each governorate. Column 4 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:3. Surge refers to the time period 2007:3 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5. Quasi-countries were denoted by the major ethno/religious group in each governorate. Kurdish includes: Arbil, Dahuk, Kirkuk, and Sulaymayyah. Shia includes: Basrah, Dhi Qar, Karbala, Maysan, Muthana, Najaf, Qadisiyyah, and Wasit. Sunni includes: Anbar, Babil, Baghdad, Diyala, Ninawa, and Salah ad Din.

Table 3A: Weekly Coalition Fatalities, Pre- & Post- Surge by Governorate 2005 - 2008:5

		1 Mean	2 Median	3 Sum	4 Observations
Anbar	Fatalities	4.75	4	708	149
	Fatalities(Pre-surge)	6.21	6	615	99
	Fatalities(surge)	2.41***	2	77	32
	Fatalities(Post-surge)	.889***	.5	16	18
Arbil	Fatalities	.0909	0	1	11
	Fatalities(Pre-surge)	0	0	0	4
	Fatalities(surge)	.5	.5	1	2
	Fatalities(Post-surge)	0	0	0	5
Babil	Fatalities	.604	0	87	144
	Fatalities(Pre-surge)	.582	0	53	91
	Fatalities(surge)	.848	0	28	33
	Fatalities(Post-surge)	.3	0	6	20
Baghdad	Fatalities	5.18	4	844	163
	Fatalities(Pre-surge)	4.33	3.5	459	106
	Fatalities(surge)	9.18***	8	303	33
	Fatalities(Post-surge)	3.42	2	82	24
Basrah	Fatalities	.945	0	104	110
	Fatalities(Pre-surge)	.853	.5	58	68
	Fatalities(surge)	1.25	1	30	24
	Fatalities(Post-surge)	.889	0	16	18
Dahuk	Fatalities	0	0	0	3
	Fatalities(Pre-surge)	0	0	0	2
	Fatalities(surge)	0	0	0	1
	Fatalities(Post-surge)	.	.	0	0
Dhi Qar	Fatalities	1	1	18	18
	Fatalities(Pre-surge)	1.1	1	11	10
	Fatalities(surge)	.5	.5	3	6
	Fatalities(Post-surge)	2	2	4	2
Diyala	Fatalities	1.02	0	158	155
	Fatalities(Pre-surge)	.626	0	62	99
	Fatalities(surge)	2.18***	1	72	33
	Fatalities(Post-surge)	1.04	0	24	23
Karbala	Fatalities	.184	0	9	49
	Fatalities(Pre-surge)	.132	0	5	38
	Fatalities(surge)	.667	0	4	6
	Fatalities(Post-surge)	0	0	0	5
Kirkuk	Fatalities	.441	0	67	152
	Fatalities(Pre-surge)	.33	0	32	97
	Fatalities(surge)	1*	0	33	33
	Fatalities(Post-surge)	.0909	0	2	22

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean number of Coalition Fatalities per week in each governorate. Column 2 lists the median and Column 3 lists the total number summed over each governorate. Column 4 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:3. Surge refers to the time period 2007:3 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5.

Table 3B: Weekly Coalition Fatalities, Pre- & Post- Surge by Governorate 2005 - 2008:5

		1 Mean	2 Median	3 Sum	4 Observations
Maysan	Fatalities	.714	0	10	14
	Fatalities(Pre-surge)	1	1	8	8
	Fatalities(surge)	.5	0	2	4
	Fatalities(Post-surge)	0	0	0	2
Muthanna	Fatalities	0	0	0	25
	Fatalities(Pre-surge)	0	0	0	18
	Fatalities(surge)	0	0	0	5
	Fatalities(Post-surge)	0	0	0	2
Najaf	Fatalities	.167	0	7	42
	Fatalities(Pre-surge)	.28	0	7	25
	Fatalities(surge)	0	0	0	12
	Fatalities(Post-surge)	0	0	0	5
Ninawa	Fatalities	.641	0	100	156
	Fatalities(Pre-surge)	.667	0	66	99
	Fatalities(surge)	.576	0	19	33
	Fatalities(Post-surge)	.625	0	15	24
Qadisiyyah	Fatalities	.338	0	26	77
	Fatalities(Pre-surge)	.333	0	15	45
	Fatalities(surge)	.391	0	9	23
	Fatalities(Post-surge)	.222	0	2	9
Salah ad Din	Fatalities	1.32	1	208	158
	Fatalities(Pre-surge)	1.43	1	144	101
	Fatalities(surge)	1.3	1	43	33
	Fatalities(Post-surge)	.875*	0	21	24
Sulaymaniyyah	Fatalities	0	0	0	11
	Fatalities(Pre-surge)	0	0	0	8
	Fatalities(surge)	0	0	0	1
	Fatalities(Post-surge)	0	0	0	2
Wasit	Fatalities	.107	0	9	84
	Fatalities(Pre-surge)	.159	0	7	44
	Fatalities(surge)	0**	0	0	29
	Fatalities(Post-surge)	.182	0	2	11
Total	Fatalities	1.55	0	2356	1521
	Fatalities(Pre-surge)	1.6	0	1542	962
	Fatalities(surge)	1.82***		624	343
	Fatalities(Post-surge)	.88***	0	190	216

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean number of Coalition Fatalities per week in each governorate. Column 2 lists the median and Column 3 lists the total number summed over each governorate. Column 4 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:3. Surge refers to the time period 2007:3 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5.

Table 4: Weekly Coalition Fatalities, Pre- & Post- Surge by Quasi-Country 2005 - 2008:5

		1 Mean	2 Median	3 Sum	4 Observations
Kurdish	Fatalities	.384	0	68	177
	Fatalities(Pre-surge)	.288	0	32	111
	Fatalities(surge)	.919	0	34	37
	Fatalities(Post-surge)	.069***	0	2	29
Shia	Fatalities	.437	0	183	419
	Fatalities(Pre-surge)	.434	0	111	256
	Fatalities(surge)	.44	0	48	109
	Fatalities(Post-surge)	.444	0	24	54
Sunni	Fatalities	2.28	1	2105	925
	Fatalities(Pre-surge)	2.35	1	1399	595
	Fatalities(surge)	2.75	1	542	197
	Fatalities(Post-surge)	1.23***	0	164	133
Total	Fatalities	1.55	0	2356	1521
	Fatalities(Pre-surge)	1.6	0	1542	962
	Fatalities(surge)	1.82***	0	624	343
	Fatalities(Post-surge)	.88***	0	190	216

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean number of Coalition Fatalities per week in each governorate. Column 2 lists the median and Column 3 lists the total number summed over each governorate. Column 4 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:3. Surge refers to the time period 2007:3 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5. Quasi-countries were denoted by the major ethno/religious group in each governorate. Kurdish includes: Arbil, Dahuk, Kirkuk, and Sulaymayyah. Shia includes: Basrah, Dhi Qar, Karbala, Maysan, Muthana, Najaf, Qadisiyyah, and Wasit. Sunni includes: Anbar, Babil, Baghdad, Diyala, Ninawa, and Salah ad Din.

Table 5A: Price Dispersion, Pre- & Post- Surge by Product 2005 - 2008:5

		1 Mean	2 Median	3 Min	4 Max	5 Observations
Barley	Price Dispersion	.149	.113	0	.981	36330
	Price Dispersion(Pre-surge)	.148	.118	0	.981	19500
	Price Dispersion(surge)	.142***	.0991	0	.742	12248
	Price Dispersion(Post-surge)	.169***	.134	0	.939	4582
Beef	Price Dispersion	.191	.134	0	2.97	79348
	Price Dispersion(Pre-surge)	.196	.134	0	2.97	44112
	Price Dispersion(surge)	.18***	.118	0	1.72	26260
	Price Dispersion(Post-surge)	.194	.116	0	2.01	8976
Chicken	Price Dispersion	.202	.154	0	2.83	107538
	Price Dispersion(Pre-surge)	.221	.169	0	2.76	54196
	Price Dispersion(surge)	.183***	.145	0	2.83	39068
	Price Dispersion(Post-surge)	.183***	.147	0	1.48	14274
Chickpeas	Price Dispersion	.303	.205	0	2.95	44740
	Price Dispersion(Pre-surge)	.371	.276	0	2.95	23748
	Price Dispersion(surge)	.229***	.154	0	1.49	16078
	Price Dispersion(Post-surge)	.218***	.16	0	1.74	4914
Cooking Oil	Price Dispersion	.233	.174	0	2.25	92722
	Price Dispersion(Pre-surge)	.241	.167	0	2.25	49104
	Price Dispersion(surge)	.22***	.17	0	2.13	33658
	Price Dispersion(Post-surge)	.237**	.204	0	.875	9960
Eggs	Price Dispersion	.148	.118	0	1.4	62088
	Price Dispersion(Pre-surge)	.175	.136	0	1.4	31080
	Price Dispersion(surge)	.131***	.111	0	.78	23082
	Price Dispersion(Post-surge)	.0946***	.0825	0	.439	7926
Fertilizer	Price Dispersion	.156	.113	0	1.92	95460
	Price Dispersion(Pre-surge)	.144	.0953	0	1.92	46746
	Price Dispersion(surge)	.156***	.118	0	1.25	36894
	Price Dispersion(Post-surge)	.202***	.152	0	1.61	11820
Fish	Price Dispersion	.277	.223	0	2.34	98516
	Price Dispersion(Pre-surge)	.314	.241	0	2.34	51122
	Price Dispersion(surge)	.236***	.182	0	1.29	36310
	Price Dispersion(Post-surge)	.242***	.201	0	1.65	11084
Flour	Price Dispersion	.297	.223	0	1.9	85328
	Price Dispersion(Pre-surge)	.334	.251	0	1.9	44616
	Price Dispersion(surge)	.263***	.201	0	1.86	30368
	Price Dispersion(Post-surge)	.236***	.188	0	1.29	10344

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean degree of price dispersion as measured as the absolute value of the log difference between prices of good i between the various governorates per week in each governorate. Column 2 lists the median and Column 3 lists the minimum and Column 4 lists the maximum. Column 5 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:3. Surge refers to the time period 2007:3 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5.

Table 5B: Price Dispersion, Pre- & Post- Surge by Product 2005 - 2008:5

		1 Mean	2 Median	3 Min	4 Max	5 Observations
Fuel	Price Dispersion	.358	.262	0	3.83	71494
	Price Dispersion(Pre-surge)	.453	.357	0	3.6	21946
	Price Dispersion(surge)	.319***	.223	0	2.75	34364
	Price Dispersion(Post-surge)	.31***	.223	0	3.83	15184
Lentils	Price Dispersion	.269	.201	0	3.09	49678
	Price Dispersion(Pre-surge)	.259	.201	0	3.09	25898
	Price Dispersion(surge)	.274***	.201	0	1.82	18316
	Price Dispersion(Post-surge)	.303***	.217	0	1.9	5464
Maize	Price Dispersion	.303	.251	0	1.61	26442
	Price Dispersion(Pre-surge)	.336	.297	0	1.61	13244
	Price Dispersion(surge)	.266***	.223	0	1.2	10018
	Price Dispersion(Post-surge)	.281***	.237	0	1.16	3180
Milk	Price Dispersion	.254	.167	0	3	69572
	Price Dispersion(Pre-surge)	.233	.167	0	2.15	32050
	Price Dispersion(surge)	.208***	.143	0	1.95	22632
	Price Dispersion(Post-surge)	.367***	.262	0	3	14890
Mutton	Price Dispersion	.108	.087	0	.588	30352
	Price Dispersion(Pre-surge)	.111	.087	0	.588	16884
	Price Dispersion(surge)	.107***	.0741	0	.582	9900
	Price Dispersion(Post-surge)	.0998***	.0741	0	.419	3568
Rice	Price Dispersion	.308	.228	0	2.83	178012
	Price Dispersion(Pre-surge)	.307	.223	0	2.83	95776
	Price Dispersion(surge)	.323***	.241	0	2.8	58402
	Price Dispersion(Post-surge)	.277***	.223	0	2.36	23834
Sugar	Price Dispersion	.156	.118	0	2.96	59528
	Price Dispersion(Pre-surge)	.111	.0822	0	2.96	30334
	Price Dispersion(surge)	.197***	.163	0	1.25	19968
	Price Dispersion(Post-surge)	.214***	.136	0	1.5	9226
Tomato Paste	Price Dispersion	.193	.154	0	3.58	91542
	Price Dispersion(Pre-surge)	.184	.154	0	3.58	45972
	Price Dispersion(surge)	.184	.143	0	1.8	31334
	Price Dispersion(Post-surge)	.24***	.168	0	2.64	14236
Wheat	Price Dispersion	.181	.146	0	2.56	84240
	Price Dispersion(Pre-surge)	.192	.151	0	2.56	44844
	Price Dispersion(surge)	.169***	.14	0	1.58	28666
	Price Dispersion(Post-surge)	.162***	.14	0	.762	10730
Total	Price Dispersion	.234	.167	0	3.83	1362930
	Price Dispersion(Pre-surge)	.242	.172	0	3.6	691172
	Price Dispersion(surge)	.221***	.159	0	2.83	487566
	Price Dispersion(Post-surge)	.237***	.167	0	3.83	184192

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean degree of price dispersion as measured as the absolute value of the log difference between prices of good i between the various governorates per week in each governorate. Column 2 lists the median and Column 3 lists the minimum and Column 4 lists the maximum. Column 5 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:1. Surge refers to the time period 2007:1 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5.

Table 6: Price Dispersion, Pre- & Post- Surge by Product-type 2005 - 2008:5

		1 Mean	2 Median	3 Min	4 Max	5 Observations
Non-Tradables	Price Dispersion	.242	.154	0	3.83	166954
	Price Dispersion(Pre-surge)	.243	.135	0	3.6	68692
	Price Dispersion(surge)	.234***	.161	0	2.75	71258
	Price Dispersion(Post-surge)	.263***	.182	0	3.83	27004
Tradables	Price Dispersion	.233	.167	0	3.58	1195976
	Price Dispersion(Pre-surge)	.242	.181	0	3.58	622480
	Price Dispersion(surge)	.219***	.159	0	2.83	416308
	Price Dispersion(Post-surge)	.233***	.164	0	3	157188
Total	Price Dispersion	.234	.167	0	3.83	1362930
	Price Dispersion(Pre-surge)	.242	.172	0	3.6	691172
	Price Dispersion(surge)	.221***	.159	0	2.83	487566
	Price Dispersion(Post-surge)	.237***	.167	0	3.83	184192

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean degree of price dispersion as measured as the absolute value of the log difference between prices of good i between the various governorates per week in each governorate. Column 2 lists the median and Column 3 lists the minimum and Column 4 lists the maximum. Column 5 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:3. Surge refers to the time period 2007:3 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5.

Table 7A: Price Dispersion, Pre- & Post- Surge by Governorate 2005 - 2008:5

		1 Mean	2 Median	3 Min	4 Max	5 Observations
Anbar	Price Dispersion	.234	.16	0	3.4	57124
	Price Dispersion(Pre-surge)	.271	.182	0	3.4	25111
	Price Dispersion(surge)	.198***	.141	0	2.53	27376
	Price Dispersion(Post-surge)	.247***	.176	0	3.34	4637
Arbil	Price Dispersion	.231	.167	0	3.7	88802
	Price Dispersion(Pre-surge)	.237	.167	0	3.27	48129
	Price Dispersion(surge)	.224***	.167	0	2.74	28703
	Price Dispersion(Post-surge)	.225***	.163	0	3.7	11970
Babil	Price Dispersion	.242	.179	0	3.13	69752
	Price Dispersion(Pre-surge)	.259	.182	0	2.91	34544
	Price Dispersion(surge)	.214***	.16	0	2.25	25465
	Price Dispersion(Post-surge)	.254***	.168	0	3.13	9743
Baghdad	Price Dispersion	.202	.142	0	3.46	93459
	Price Dispersion(Pre-surge)	.213	.148	0	3.46	47961
	Price Dispersion(surge)	.188***	.134	0	2.52	32428
	Price Dispersion(Post-surge)	.199	.134	0	3.22	13070
Basrah	Price Dispersion	.21	.151	0	3.22	72433
	Price Dispersion(Pre-surge)	.227	.154	0	3.09	34715
	Price Dispersion(surge)	.19***	.134	0	2.48	26854
	Price Dispersion(Post-surge)	.208***	.148	0	3.22	10864
Dahuk	Price Dispersion	.223	.154	0	3.83	76323
	Price Dispersion(Pre-surge)	.225	.154	0	3.46	40463
	Price Dispersion(surge)	.224	.159	0	2.8	24978
	Price Dispersion(Post-surge)	.216***	.149	0	3.83	10882
Dhi Qar	Price Dispersion	.239	.172	0	3.54	76193
	Price Dispersion(Pre-surge)	.243	.178	0	3.54	41113
	Price Dispersion(surge)	.236***	.167	0	2.75	24585
	Price Dispersion(Post-surge)	.231***	.167	0	3.44	10495
Diyala	Price Dispersion	.221	.167	0	3.51	76649
	Price Dispersion(Pre-surge)	.258	.205	0	3.51	35309
	Price Dispersion(surge)	.175***	.128	0	2.4	29122
	Price Dispersion(Post-surge)	.224***	.163	0	3.3	12218
Karbala	Price Dispersion	.215	.152	0	3.37	83688
	Price Dispersion(Pre-surge)	.218	.152	0	2.9	43497
	Price Dispersion(surge)	.206***	.147	0	2.83	29142
	Price Dispersion(Post-surge)	.224**	.161	0	3.37	11049
Kirkuk	Price Dispersion	.231	.163	0	3.58	77771
	Price Dispersion(Pre-surge)	.27	.182	0	3.58	36591
	Price Dispersion(surge)	.187***	.131	0	2.56	28816
	Price Dispersion(Post-surge)	.216***	.145	0	3.44	12364

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean degree of price dispersion as measured as the absolute value of the log difference between prices of good i between the various governorates per week in each governorate. Column 2 lists the median and Column 3 lists the minimum and Column 4 lists the maximum. Column 5 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:3. Surge refers to the time period 2007:3 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5.

Table 7B: Price Dispersion, Pre- & Post- Surge by Governorate 2005 - 2008:5

		1 Mean	2 Median	3 Min	4 Max	5 Observations
Maysan	Price Dispersion	.291	.223	0	3.83	71143
	Price Dispersion(Pre-surge)	.277	.208	0	2.71	36403
	Price Dispersion(surge)	.301***	.242	0	2.83	24870
	Price Dispersion(Post-surge)	.317***	.247	0	3.83	9870
Muthanna	Price Dispersion	.254	.182	0	3.22	78120
	Price Dispersion(Pre-surge)	.251	.182	0	3.17	41982
	Price Dispersion(surge)	.246***	.182	0	2.75	25548
	Price Dispersion(Post-surge)	.288***	.201	0	3.22	10590
Najaf	Price Dispersion	.209	.147	0	3.44	75624
	Price Dispersion(Pre-surge)	.214	.151	0	2.59	31567
	Price Dispersion(surge)	.2***	.143	0	2.77	31794
	Price Dispersion(Post-surge)	.22***	.154	0	3.44	12263
Ninawa	Price Dispersion	.198	.134	0	3.73	89414
	Price Dispersion(Pre-surge)	.203	.134	0	3.6	47872
	Price Dispersion(surge)	.188***	.134	0	2.6	30120
	Price Dispersion(Post-surge)	.201	.14	0	3.73	11422
Qadisiyyah	Price Dispersion	.285	.201	0	3.37	67161
	Price Dispersion(Pre-surge)	.268	.182	0	3.37	36297
	Price Dispersion(surge)	.322***	.238	0	2.71	21519
	Price Dispersion(Post-surge)	.267***	.188	0	3.3	9345
Salah ad Din	Price Dispersion	.223	.161	0	3.51	56092
	Price Dispersion(Pre-surge)	.232	.163	0	3.51	24699
	Price Dispersion(surge)	.21***	.154	0	2.67	27699
	Price Dispersion(Post-surge)	.261***	.182	0	2.53	3694
Sulaymaniyyah	Price Dispersion	.259	.182	0	3.78	71645
	Price Dispersion(Pre-surge)	.25	.169	0	3.22	40866
	Price Dispersion(surge)	.273***	.201	0	2.72	22534
	Price Dispersion(Post-surge)	.264***	.2	0	3.78	8245
Wasit	Price Dispersion	.265	.194	0	3.6	81537
	Price Dispersion(Pre-surge)	.269	.194	0	3.6	44053
	Price Dispersion(surge)	.259***	.194	0	2.3	26013
	Price Dispersion(Post-surge)	.26***	.206	0	3.57	11471
Total	Price Dispersion	.234	.167	0	3.83	1362930
	Price Dispersion(Pre-surge)	.242	.172	0	3.6	691172
	Price Dispersion(surge)	.221***	.159	0	2.83	487566
	Price Dispersion(Post-surge)	.237***	.167	0	3.83	184192

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean degree of price dispersion as measured as the absolute value of the log difference between prices of good i between the various governorates per week in each governorate. Column 2 lists the median and Column 3 lists the minimum and Column 4 lists the maximum. Column 5 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:3. Surge refers to the time period 2007:3 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5.

Table 8: Price Dispersion, Pre- & Post- Surge by Quasi-Country 2005 - 2008:5

		1 Mean	2 Median	3 Min	4 Max	5 Observations
Kurdish	Price Dispersion	.235	.167	0	3.83	314541
	Price Dispersion(Pre-surge)	.245	.171	0	3.58	166049
	Price Dispersion(surge)	.224***	.163	0	2.8	105031
	Price Dispersion(Post-surge)	.228***	.16	0	3.83	43461
Shia	Price Dispersion	.245	.182	0	3.83	605899
	Price Dispersion(Pre-surge)	.247	.182	0	3.6	309627
	Price Dispersion(surge)	.241***	.182	0	2.83	210325
	Price Dispersion(Post-surge)	.25***	.182	0	3.83	85947
Sunni	Price Dispersion	.218	.154	0	3.73	442490
	Price Dispersion(Pre-surge)	.235	.164	0	3.6	215496
	Price Dispersion(surge)	.195***	.143	0	2.67	172210
	Price Dispersion(Post-surge)	.223***	.154	0	3.73	54784
Total	Price Dispersion	.234	.167	0	3.83	1362930
	Price Dispersion(Pre-surge)	.242	.172	0	3.6	691172
	Price Dispersion(surge)	.221***	.159	0	2.83	487566
	Price Dispersion(Post-surge)	.237***	.167	0	3.83	184192

See Notes: ***, ** and * represent statistical significance at the .01, .05 and .10 levels, respectively. Column 1 lists the mean degree of price dispersion as measured as the absolute value of the log difference between prices of good i between the various governorates per week in each governorate. Column 2 lists the median and Column 3 lists the minimum and Column 4 lists the maximum. Column 5 lists the number of observations in each sample. Pre-surge refers to the time period 2005:1 to 2007:1. Surge refers to the time period 2007:1 to 2007:11 and Post-surge refers to the time period 2007:12 to 2008:5.

Table 9: Gravity Model for Price Dispersion: 2005:1 - 2008:5 Full Country Sample

	1	2	3	4	5	6	7	8
	Basic	Borders	Indiv Borders	Indiv Borders	G.F.E.	T.F.E.	D.F.E.	D.T.F.E.
SURGE	-0.021***	-0.020***	-0.021***	-0.023***	-0.020***	-0.072***	-0.022***	-0.111***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.019]	[0.002]	[0.020]
POSTSURGE	-0.005***	-0.007***	-0.007***	-0.013***	-0.008***	-0.026	-0.029***	-0.085***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.019]	[0.003]	[0.020]
LN(DISTANCE)		0.020***	0.021***	0.021***	0.039***	0.020***		
		[0.001]	[0.001]	[0.001]	[0.001]	[0.001]		
BORDER		0.007***						
		[0.001]						
ETHNOFRAC		0.074***						
		[0.002]						
SHIA			0.009***	-0.007***	-0.016***	-0.009***		
			[0.001]	[0.001]	[0.002]	[0.001]		
SUNNI			-0.028***	-0.014***	0.010***	-0.016***		
			[0.001]	[0.001]	[0.002]	[0.001]		
KURDISH			-0.035***	-0.031***	-0.009***	-0.028***		
			[0.001]	[0.002]	[0.002]	[0.002]		
SURGE*SHIA				0.033***	0.036***	0.034***	0.032***	0.033***
				[0.002]	[0.002]	[0.002]	[0.005]	[0.005]
SURGE*SUNNI				-0.031***	-0.036***	-0.028***	-0.031***	-0.029***
				[0.002]	[0.002]	[0.002]	[0.006]	[0.006]
SURGE*KURDISH				-0.013***	-0.014***	-0.017***	-0.021**	-0.024**
				[0.003]	[0.003]	[0.003]	[0.009]	[0.009]
POST*SHIA				0.033***	0.031***	0.034***	0.024***	0.025***
				[0.002]	[0.002]	[0.002]	[0.006]	[0.006]
POST*SUNNI				-0.001	0.002	0.002	0.003	0.004
				[0.003]	[0.003]	[0.003]	[0.007]	[0.007]
POST*KURDISH				-0.009**	-0.009**	-0.013***	-0.009	-0.011
				[0.004]	[0.004]	[0.004]	[0.011]	[0.011]
FATALITES(US)		-0.001***	-0.001***	-0.001***	0.001***	-0.001***	0.001***	0.001**
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
FATALITES(ISF)		-0.001***	-0.001***	-0.001***	0	-0.001***	0	0
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
IMPORTS		0.008***	0.008***	0.008***	0.010***	0.008***		
		[0.001]	[0.001]	[0.001]	[0.001]	[0.001]		
MIDEAST IMPORTS		-0.040***	-0.040***	-0.040***	-0.037***	-0.039***		
		[0.001]	[0.001]	[0.001]	[0.001]	[0.001]		
OBSERVATIONS	681465	681465	681465	681465	681465	681465	681465	681465

Notes: clustered standard errors by good governorate dyad are presented in parentheses. $***$, $**$ and $*$ represent statistical significance at the .01, .05 and .10 levels, respectively. Each column is the basic gravity model estimated over full country sample 2005-2008:5. Columns 1-8 were estimated using OLS. Column 5 includes governorate fixed effects (G.F.E.) though not reported. Column 6 includes time fixed effects (T.F.E.) though not reported. Column 7 includes dyad good governorate fixed effects (D.F.E.) though not reported. Column 8 includes dyad good governorate and time fixed effects (D.T.F.E.) though not reported. Included in the regression are: log physical distance LN(DISTANCE), dummy variable for border (BORDER), H.H.I. index of ethno-fractionalization (ETHNOFRAC) dummy variable for quasi-countries (KURDISH, SHIA, SUNNI), dummy variable if goods are imported (IMPORTS) or imported from Middle Eastern countries (MIDEAST IMPORTS), the number of US fatalities in governorate year (FATALITIES(US)) and the number of ISF fatalities in governorate year (FATALITIES(ISF)). SURGE refers to the time period 2007:3 to 2007:11 and POSTSURGE refers to the time period 2007:12 to 2008:5. Quasi-countries were denoted by the major ethno/religious group in each governorate. Kurdish includes: Arbil, Dahuk, Kirkuk, and Sulaymayyah. Shia includes: Basrah, Dhi Qar, Karbala, Maysan, Muthana, Najaf, Qadisiyyah, and Wasit. Sunni includes: Anbar, Babil, Baghdad, Diyala, Ninawa, and Salah ad Din. SURGE*Country and POST*Country are dummy variables interacted between Quasi-Country and SURGE, POSTSURGE.

Table 10A: Gravity Model for Price Dispersion by Product: 2005:1-2008:5 Full Country Sample

	1	2	3	4	5	6	7	8	9	10
	all	Barley	Beef	Chicken	Chickpeas	Cooking Oil	Eggs	Fertilizer	Fish	Flour
SURGE	-0.111***	-0.049	-0.023	0.099**	-0.206**	0.01	-0.026*	0.027	-0.487***	0.019
	[0.020]	[0.038]	[0.026]	[0.050]	[0.090]	[0.040]	[0.015]	[0.017]	[0.138]	[0.023]
POSTSURGE	-0.085***	-0.104***	0.012	0.116**	-0.251***	0.019	-0.004	0.053***	-0.488***	-0.017
	[0.020]	[0.036]	[0.028]	[0.050]	[0.089]	[0.040]	[0.016]	[0.017]	[0.137]	[0.023]
SURGE*SHIA	0.033***	0.035**	-0.015	0.060***	0.173***	0.034**	0.085***	0.011	-0.018	0.016
	[0.005]	[0.017]	[0.023]	[0.014]	[0.028]	[0.017]	[0.009]	[0.012]	[0.017]	[0.018]
SURGE*SUNNI	-0.029***	-0.041**	0.021	0.011	-0.136**	-0.018	-0.01	-0.002	-0.057***	-0.062**
	[0.006]	[0.016]	[0.021]	[0.013]	[0.056]	[0.018]	[0.013]	[0.012]	[0.016]	[0.030]
SURGE*KURDISH	-0.024**	-0.096***	-0.068	-0.022	-0.078	0.017	0.001	0.003	-0.006	0.044
	[0.009]	[0.030]	[0.055]	[0.044]	[0.058]	[0.023]	[0.023]	[0.015]	[0.034]	[0.033]
POST*SHIA	0.025***	0.048**	-0.034	0.057***	0.145***	0	0.052***	-0.007	-0.038*	0.027
	[0.006]	[0.022]	[0.029]	[0.016]	[0.025]	[0.028]	[0.009]	[0.015]	[0.020]	[0.020]
POST*SUNNI	0.004	0.034	0.052**	0.036**	-0.052	0.011	-0.015	0.044**	-0.036*	-0.081**
	[0.007]	[0.029]	[0.025]	[0.018]	[0.050]	[0.034]	[0.016]	[0.022]	[0.022]	[0.036]
POST*KURDISH	-0.011	-0.079***	-0.092*	-0.069	0.007	0.05	0.004	0.009	0.019	-0.002
	[0.011]	[0.019]	[0.055]	[0.054]	[0.082]	[0.034]	[0.022]	[0.020]	[0.028]	[0.037]
FATALITES(US)	0.000**	0.002***	-0.002***	0	0.006***	0	0.001***	0	0.001***	0.001
	[0.000]	[0.001]	[0.001]	[0.000]	[0.001]	[0.001]	[0.000]	[0.000]	[0.001]	[0.001]
FATALITES(ISF)	0	0	0	0.000**	0.002***	-0.000*	0.001***	0	0	-0.001***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
OBSERVATIONS	681465	18165	39674	53769	22370	46361	31044	47730	49258	42664
R-Squared	0.01	0.1	0.05	0.05	0.15	0.05	0.19	0.06	0.09	0.05

Notes: clustered standard errors by good governorate dyad are presented in parentheses. $***$, $**$ and $*$ represent statistical significance at the .01, .05 and .10 levels, respectively. Each column is the basic gravity model estimated over full country sample 2005-2008:5. Columns 1-10 were estimated using OLS and include dyad good governorate and time fixed effects (D.T.F.E.) though not reported. Included in the regression are: log physical distance LN(DISTANCE), log physical area (area),dummy variable for language (Comlang), dummy variable for border (BORDER), dummy variable for quasi-countries (KURDISH, SHIA, SUNNI), dummy variable if goods are imported (IMPORTS) or imported from Middle Eastern countries (MIDEAST IMPORTS), the number of US fatalities in governorate year (FATALITIES(US)) and the number of ISF fatalities in governorate year (FATALITIES(ISF)). SURGE refers to the time period 2007:3 to 2007:11 and POSTSURGE refers to the time period 2007:12 to 2008:5. Quasi-countries were denoted by the major ethno/religious group in each governorate. Kurdish includes: Arbil, Dahuk, Kirkuk, and Sulaymayyah. Shia includes: Basrah, Dhi Qar, Karbala, Maysan, Muthana, Najaf, Qadisiyyah, and Wasit. Sunni includes: Anbar, Babil, Baghdad, Diyala, Ninawa, and Salah ad Din. SURGE*Country and POST*Country are dummy variables interacted between Quasi-Country and SURGE, POSTSURGE.

Table 10B: Gravity Model for Price Dispersion by Product: 2005:1-2008:5 Full Country Sample

	1	2	3	4	5	6	7	8	9	10
	all	Fuel	Lentils	Maize	Milk	Mutton	Rice	Sugar	Tomato Paste	Wheat
SURGE	-0.111***	-0.357***	0.198***	-0.356***	-0.036	0.042**	0.021	-0.045	-0.496***	-0.220**
	[0.020]	[0.033]	[0.062]	[0.132]	[0.059]	[0.019]	[0.019]	[0.056]	[0.163]	[0.094]
POSTSURGE	-0.085***	-0.139***	0.147**	-0.442***	-0.017	0.024	0.035*	-0.089	-0.451***	-0.205**
	[0.020]	[0.054]	[0.064]	[0.132]	[0.060]	[0.018]	[0.018]	[0.055]	[0.163]	[0.094]
SURGE*SHIA	0.033***	0.016	-0.022	0.080**	0.085**	0.008	0.056***	-0.018	0.016	0.023
	[0.005]	[0.026]	[0.030]	[0.031]	[0.042]	[0.012]	[0.018]	[0.015]	[0.017]	[0.019]
SURGE*SUNNI	-0.029***	0.163***	-0.061***	0.022	-0.033	-0.034***	-0.084***	-0.007	-0.041***	-0.023
	[0.006]	[0.023]	[0.019]	[0.038]	[0.021]	[0.013]	[0.021]	[0.020]	[0.013]	[0.016]
SURGE*KURDISH	-0.024**	0.146***	0.219***	-0.033	0.002	-0.018	-0.098***	-0.009	-0.063	-0.050**
	[0.009]	[0.019]	[0.080]	[0.033]	[0.026]	[0.011]	[0.016]	[0.026]	[0.039]	[0.020]
POST*SHIA	0.025***	0.002	0.022	0.065	0.08	0.009	0.061***	-0.001	0.006	0.009
	[0.006]	[0.036]	[0.046]	[0.040]	[0.052]	[0.015]	[0.014]	[0.011]	[0.019]	[0.016]
POST*SUNNI	0.004	0.224***	0.016	0.016	-0.028	0.005	-0.017	0.023	-0.021	0
	[0.007]	[0.034]	[0.030]	[0.062]	[0.023]	[0.021]	[0.023]	[0.024]	[0.018]	[0.018]
POST*KURDISH	-0.011	0.260***	0.113*	0.041	0.041	-0.025	-0.01	-0.006	-0.084**	-0.087***
	[0.011]	[0.045]	[0.060]	[0.051]	[0.038]	[0.020]	[0.023]	[0.016]	[0.039]	[0.017]
FATALITES(US)	0.000**	0.001*	0.002***	0.004**	0	0	0	-0.003***	0.001	0
	[0.000]	[0.001]	[0.001]	[0.002]	[0.001]	[0.000]	[0.001]	[0.000]	[0.000]	[0.001]
FATALITES(ISF)	0	-0.001**	0	0	0.000**	0	0	0	0.000*	0
	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
OBSERVATIONS	681465	35747	24839	13221	34786	15176	89006	29764	45771	42120
R-Squared	0.01	0.09	0.05	0.09	0.04	0.06	0.06	0.19	0.06	0.07

Notes: clustered standard errors by good governorate dyad are presented in parentheses. $***$, $**$ and $*$ represent statistical significance at the .01, .05 and .10 levels, respectively. Each column is the basic gravity model estimated over full country sample 2005-2008:5. Columns 1-10 were estimated using OLS and include dyad good governorate and time fixed effects (D.T.F.E.) though not reported. Included in the regression are: log physical distance LN(DISTANCE), log physical area (area),dummy variable for language (Comlang), dummy variable for border (BORDER), dummy variable for quasi-countries (KURDISH, SHIA, SUNNI), dummy variable if goods are imported (IMPORTS) or imported from Middle Eastern countries (MIDEAST IMPORTS), the number of US fatalities in governorate year (FATALITIES(US)) and the number of ISF fatalities in governorate year (FATALITIES(ISF)). SURGE refers to the time period 2007:3 to 2007:11 and POSTSURGE refers to the time period 2007:12 to 2008:5. Quasi-countries were denoted by the major ethno/religious group in each governorate. Kurdish includes: Arbil, Dahuk, Kirkuk, and Sulaymayyah. Shia includes: Basrah, Dhi Qar, Karbala, Maysan, Muthana, Najaf, Qadisiyyah, and Wasit. Sunni includes: Anbar, Babil, Baghdad, Diyala, Ninawa, and Salah ad Din. SURGE*Country and POST*Country are dummy variables interacted between Quasi-Country and SURGE, POSTSURGE.

Table 11A: Gravity Model for Price Dispersion by Governorate: 2005:1-2008:5 Full Country Sample

	1 all	2 Anbar	3 Arbil	4 Babil	5 Baghdad	6 Basrah	7 Dahuk	8 Dhi Qar	9 Diyala	10 Karbala
SURGE	-0.111***	-0.086***	-0.063**	-0.011	-0.025*	-0.044***	-0.073**	-0.043	-0.092***	0.025**
	[0.020]	[0.018]	[0.031]	[0.012]	[0.015]	[0.012]	[0.035]	[0.033]	[0.011]	[0.011]
POSTSURGE	-0.085***	0.024	-0.081***	-0.018	-0.016	-0.018	-0.096***	-0.048	-0.096***	0.016
	[0.020]	[0.020]	[0.031]	[0.014]	[0.019]	[0.016]	[0.035]	[0.032]	[0.014]	[0.011]
SURGE*SHIA	0.033***					0.056***		0.046***		0.031***
	[0.005]					[0.009]		[0.011]		[0.010]
SURGE*SUNNI	-0.029***	-0.001		-0.027**	-0.021**				0.004	
	[0.006]	[0.015]		[0.012]	[0.009]				[0.011]	
SURGE*KURDISH	-0.024**		-0.028**				-0.035***			
	[0.009]		[0.012]				[0.013]			
POST*SHIA	0.025***					0.052***		0.038***	0	0.027**
	[0.006]					[0.011]		[0.013]	[0.000]	[0.012]
POST*SUNNI	0.004	0.024		-0.014	0.001			0	0.027*	
	[0.007]	[0.018]		[0.015]	[0.011]			[0.000]	[0.014]	
POST*KURDISH	-0.011		0.001				-0.006			
	[0.011]		[0.014]				[0.014]			
FATALITES(US)	0.000**	0	0	0.001	0.001	0.001**	0	0.001	0.001**	0.001
	[0.000]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
FATALITES(ISF)	0	0	0.000**	-0.001***	0	0	0.000***	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
OBSERVATIONS	681465	57124	88802	69752	93459	72433	76323	76193	76649	83688
R-Squared	0.01	0.05	0.01	0.03	0.02	0.03	0.01	0.02	0.07	0.01

Notes: clustered standard errors by good governorate dyad are presented in parentheses. $***$, $**$ and $*$ represent statistical significance at the .01, .05 and .10 levels, respectively. Each column is the basic gravity model estimated over full country sample 2005-2008:5. Columns 1-10 were estimated using OLS and include dyad good governorate and time fixed effects (D.T.F.E.) though not reported. Included in the regression are: log physical distance LN(DISTANCE), log physical area (area),dummy variable for language (Comlang), dummy variable for border (BORDER), dummy variable for quasi-countries (KURDISH, SHIA, SUNNI), dummy variable if goods are imported (IMPORTS) or imported from Middle Eastern countries (MIDEAST IMPORTS), the number of US fatalities in governorate year (FATALITIES(US)) and the number of ISF fatalities in governorate year (FATALITIES(ISF)). SURGE refers to the time period 2007:3 to 2007:11 and POSTSURGE refers to the time period 2007:12 to 2008:5. Quasi-countries were denoted by the major ethno/religious group in each governorate. Kurdish includes: Arbil, Dahuk, Kirkuk, and Sulaymayyah. Shia includes: Basrah, Dhi Qar, Karbala, Maysan, Muthana, Najaf, Qadisiyyah, and Wasit. Sunni includes: Anbar, Babil, Baghdad, Diyala, Ninawa, and Salah ad Din. SURGE*Country and POST*Country are dummy variables interacted between Quasi-Country and SURGE, POSTSURGE.

Table 11B: Gravity Model for Price Dispersion by Governorate: 2005:1-2008:5 Full Country Sample

	1	2	3	4	5	6	7	8	9	10
	all	Kirkuk	Maysan	Muthanna	Najaf	Ninawa	Qadisiyyah	Salah ad Din	Sulaymaniyyah	Wasit
SURGE	-0.111***	-0.327***	0.030*	-0.044*	-0.027***	-0.119***	0.003	-0.060***	-0.01	-0.021
	[0.020]	[0.086]	[0.016]	[0.025]	[0.009]	[0.041]	[0.046]	[0.011]	[0.035]	[0.014]
POSTSURGE	-0.085***	-0.319***	0.025	-0.050**	-0.012	-0.107**	-0.076*	0.013	0.002	0.006
	[0.020]	[0.085]	[0.017]	[0.025]	[0.009]	[0.042]	[0.045]	[0.017]	[0.035]	[0.014]
SURGE*SHIA	0.033***		0.005	0.032***	0.037***		0.001			-0.005
	[0.005]		[0.016]	[0.012]	[0.009]		[0.016]			[0.013]
SURGE*SUNNI	-0.029***					-0.031***		-0.025**		
	[0.006]					[0.010]		[0.010]		
SURGE*KURDISH	-0.024**	-0.018							-0.033**	
	[0.009]	[0.017]							[0.016]	
POST*SHIA	0.025***		0.009	0.021	0.025**		0.028**			-0.014
	[0.006]		[0.018]	[0.014]	[0.011]		[0.013]			[0.014]
POST*SUNNI	0.004					-0.01		0.001		
	[0.007]					[0.012]		[0.015]		
POST*KURDISH	-0.011	-0.012							-0.005	
	[0.011]	[0.019]							[0.017]	
FATALITES(US)	0.000**	0	0	0	0.001**	0	-0.002*	0.001	0.001	-0.001
	[0.000]	[0.001]	[0.001]	[0.001]	[0.001]	[0.000]	[0.001]	[0.001]	[0.001]	[0.001]
FATALITES(ISF)	0	0	0	0	0	0	0	-0.000*	0	0
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
OBSERVATIONS	681465	77771	71143	78120	75624	89414	67161	56092	71645	81537
R-Squared	0.01	0.06	0.02	0.01	0.01	0.01	0.05	0.02	0.02	0.01

Notes: clustered standard errors by good governorate dyad are presented in parentheses. $***$, $**$ and $*$ represent statistical significance at the .01, .05 and .10 levels, respectively. Each column is the basic gravity model estimated over full country sample 2005-2008:5. Columns 1-10 were estimated using OLS and include dyad good governorate and time fixed effects (D.T.F.E.) though not reported. Included in the regression are: log physical distance LN(DISTANCE), log physical area (area),dummy variable for language (Comlang), dummy variable for border (BORDER), dummy variable for quasi-countries (KURDISH, SHIA, SUNNI), dummy variable if goods are imported (IMPORTS) or imported from Middle Eastern countries (MIDEAST IMPORTS), the number of US fatalities in governorate year (FATALITIES(US)) and the number of ISF fatalities in governorate year (FATALITIES(ISF)). SURGE refers to the time period 2007:3 to 2007:11 and POSTSURGE refers to the time period 2007:12 to 2008:5. Quasi-countries were denoted by the major ethno/religious group in each governorate. Kurdish includes: Arbil, Dahuk, Kirkuk, and Sulaymayyah. Shia includes: Basrah, Dhi Qar, Karbala, Maysan, Muthana, Najaf, Qadisiyyah, and Wasit. Sunni includes: Anbar, Babil, Baghdad, Diyala, Ninawa, and Salah ad Din. SURGE*Country and POST*Country are dummy variables interacted between Quasi-Country and SURGE, POSTSURGE.

Table 12: Gravity Model for Price Dispersion – Sensitivity Tests: 2005:1-2008:5 Full Country Sample

	1	2	3	4	5	6
	all	Shia	Sunni	Kurdish	Tradables	Non-Tradables
SURGE	-0.111***	-0.01	-0.046***	-0.123***	-0.117***	0
	[0.020]	[0.013]	[0.012]	[0.024]	[0.021]	[0.020]
POSTSURGE	-0.085***	0.024*	-0.043***	-0.119***	-0.114***	-0.009
	[0.020]	[0.014]	[0.012]	[0.024]	[0.021]	[0.020]
SURGE*SHIA	0.033***	0.026***			0.035***	0.013
	[0.005]	[0.005]			[0.006]	[0.013]
SURGE*SUNNI	-0.029***		-0.018***		-0.036***	0.030**
	[0.006]		[0.006]		[0.006]	[0.012]
SURGE*KURDISH	-0.024**			-0.029***	-0.026***	0.021
	[0.009]			[0.010]	[0.010]	[0.014]
POST*SHIA	0.025***	0.022***			0.028***	-0.004
	[0.006]	[0.006]			[0.006]	[0.017]
POST*SUNNI	0.004		0.004		-0.004	0.076***
	[0.007]		[0.007]		[0.007]	[0.019]
POST*KURDISH	-0.011			-0.006	-0.019*	0.082***
	[0.011]			[0.011]	[0.011]	[0.023]
FATALITES(US)	0.000**	0	0.001***	0	0.000*	0.001**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
FATALITES(ISF)	0	0	-0.000**	0.001***	0	0
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
OBSERVATIONS	681465	479500	379577	283220	597988	83477
R-Squared	0.01	0.01	0.02	0.01	0.01	0.03

Notes: clustered standard errors by good governorate dyad are presented in parentheses. $***$, $**$ and $*$ represent statistical significance at the .01, .05 and .10 levels, respectively. Each column is the basic gravity model estimated over full country sample 2005-2008:5. Columns 1-10 were estimated using OLS and include dyad good governorate and time fixed effects (D.T.F.E.) though not reported. Included in the regression are: log physical distance LN(DISTANCE), log physical area (area),dummy variable for language (Comlang), dummy variable for border (BORDER), dummy variable for quasi-countries (KURDISH, SHIA, SUNNI), dummy variable if goods are imported (IMPORTS) or imported from Middle Eastern countries (MIDEAST IMPORTS), the number of US fatalities in governorate year (FATALITIES(US)) and the number of ISF fatalities in governorate year (FATALITIES(ISF)). SURGE refers to the time period 2007:3 to 2007:11 and POSTSURGE refers to the time period 2007:12 to 2008:5. Quasi-countries were denoted by the major ethno/religious group in each governorate. Kurdish includes: Arbil, Dahuk, Kirkuk, and Sulaymayyah. Shia includes: Basrah, Dhi Qar, Karbala, Maysan, Muthana, Najaf, Qadisiyyah, and Wasit. Sunni includes: Anbar, Babil, Baghdad, Diyala, Ninawa, and Salah ad Din. SURGE*Country and POST*Country are dummy variables interacted between Quasi-Country and SURGE, POSTSURGE.

Figure 1: Price Dispersion Across Governorates Over Time

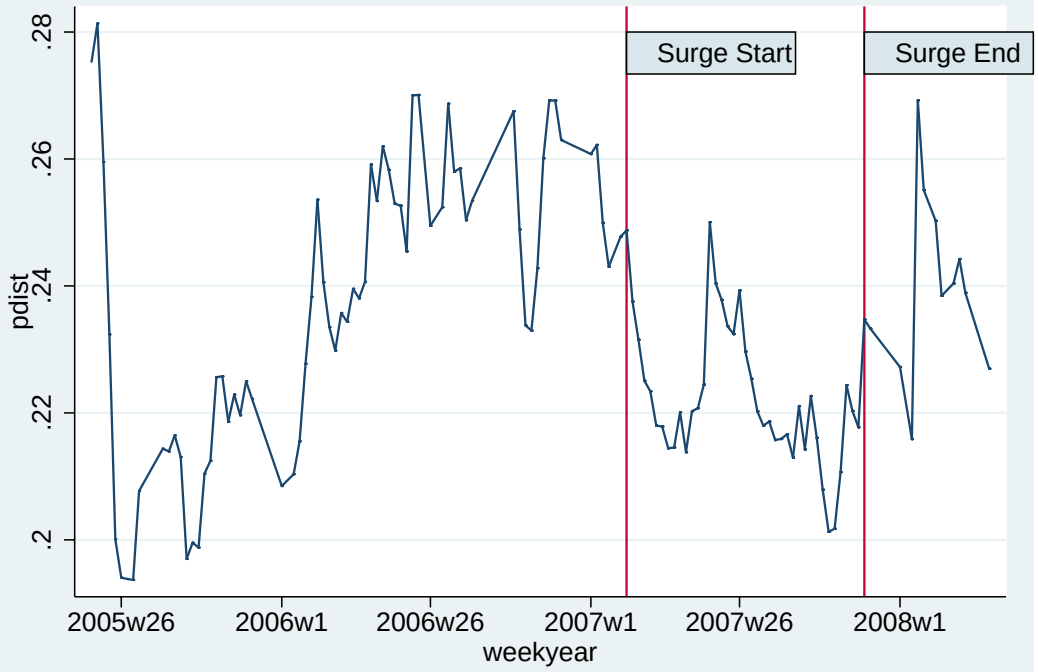


Figure 2: Price Dispersion in Selected Governorates

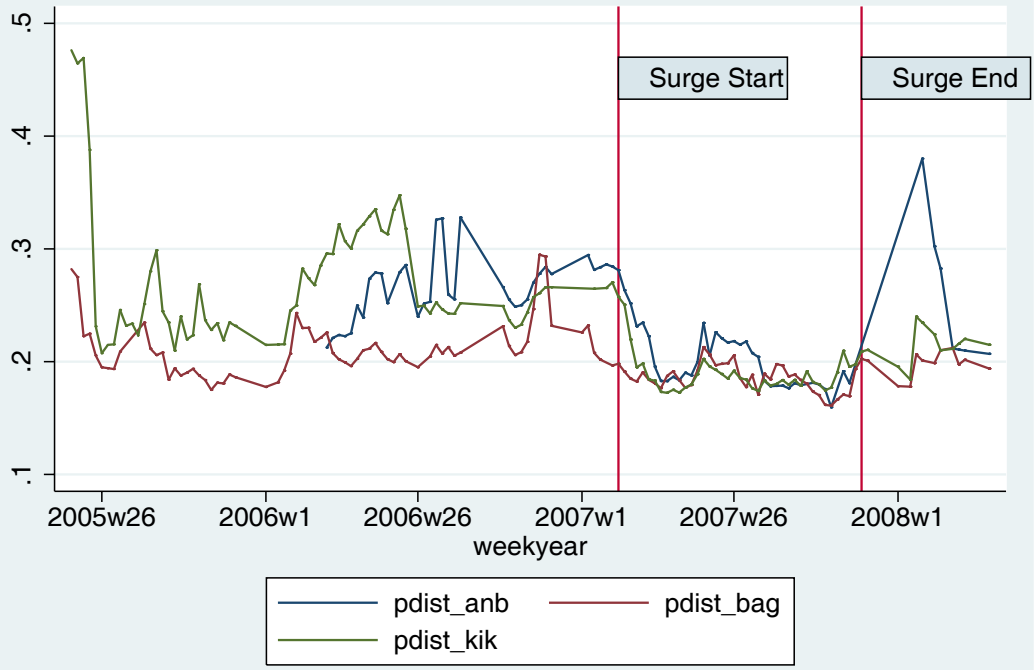


Figure 3: Price Dispersion Within Quasi Countries Over Time

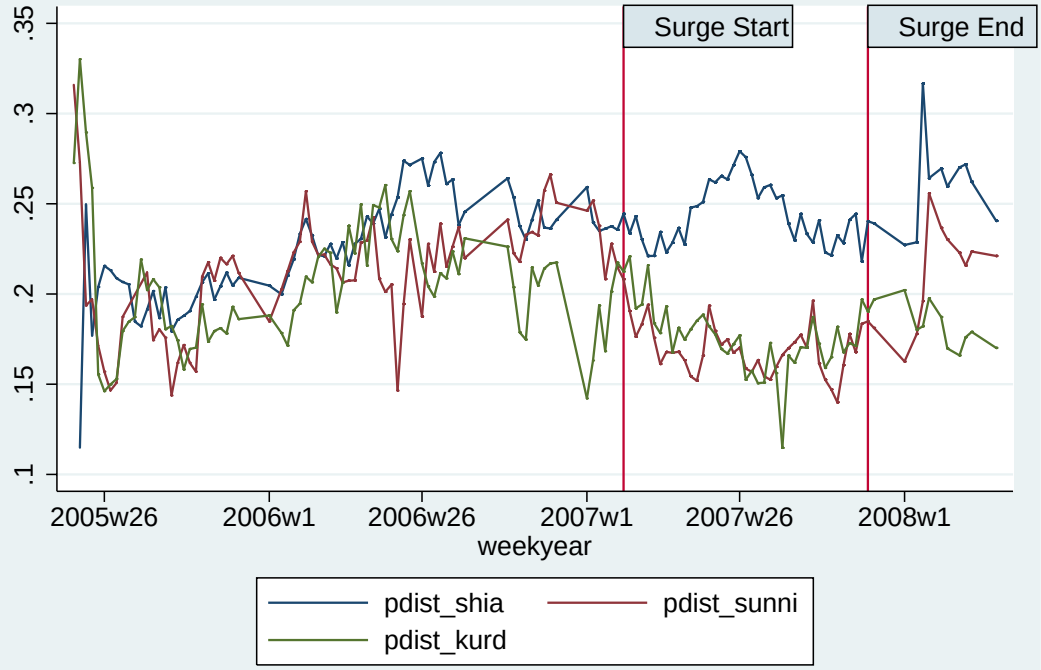


Figure 4A: Iraqi Casualities Across Governorates Over Time

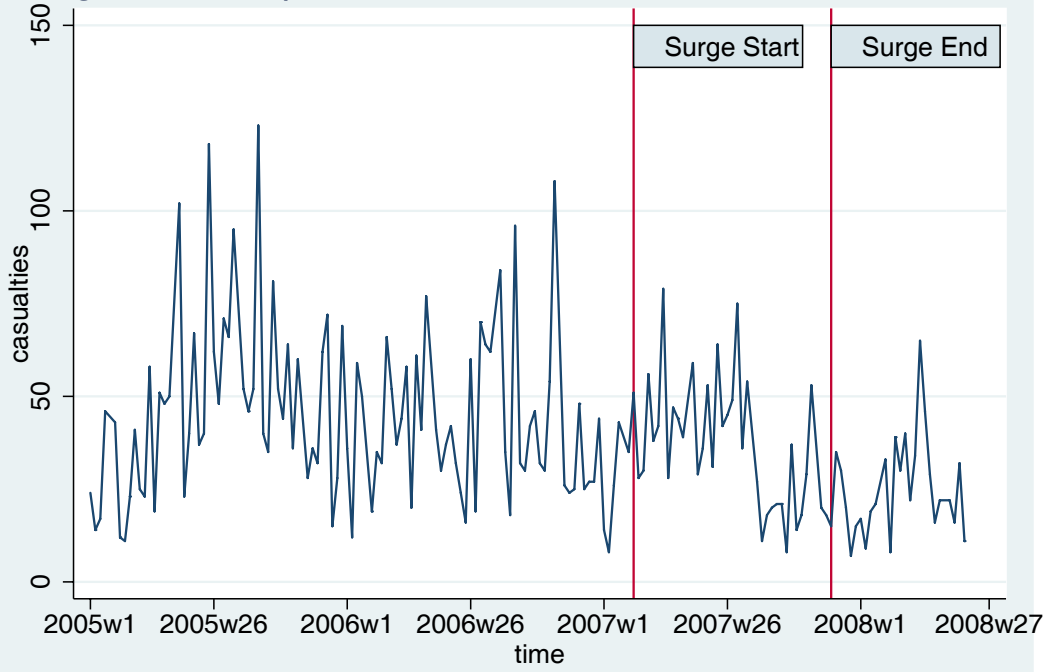


Figure 4B: Coalition Casualities Across Governorates Over Time

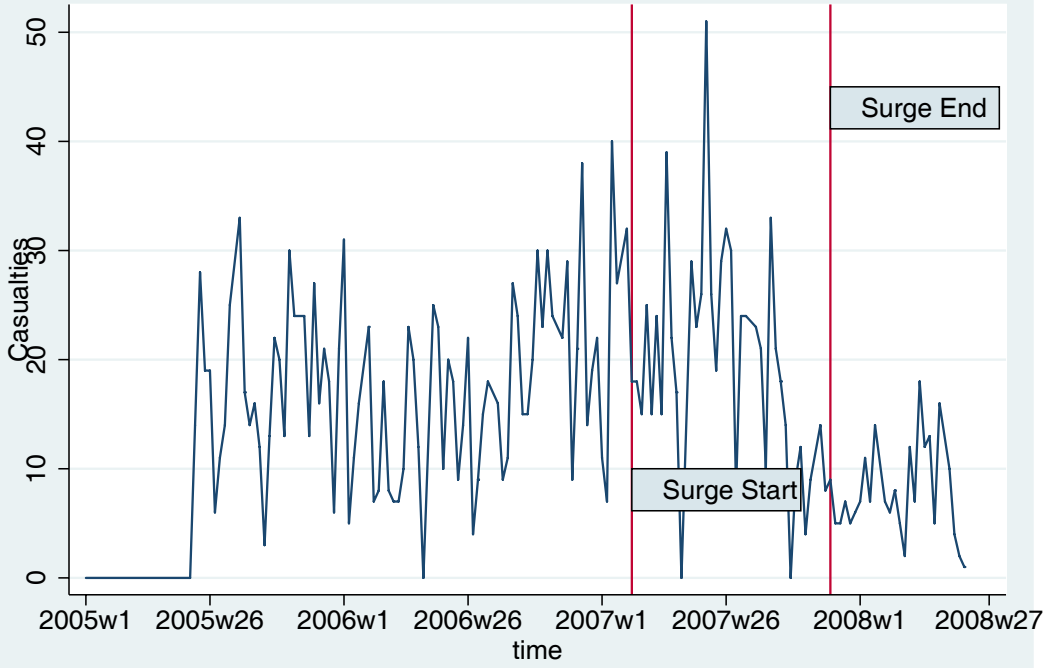
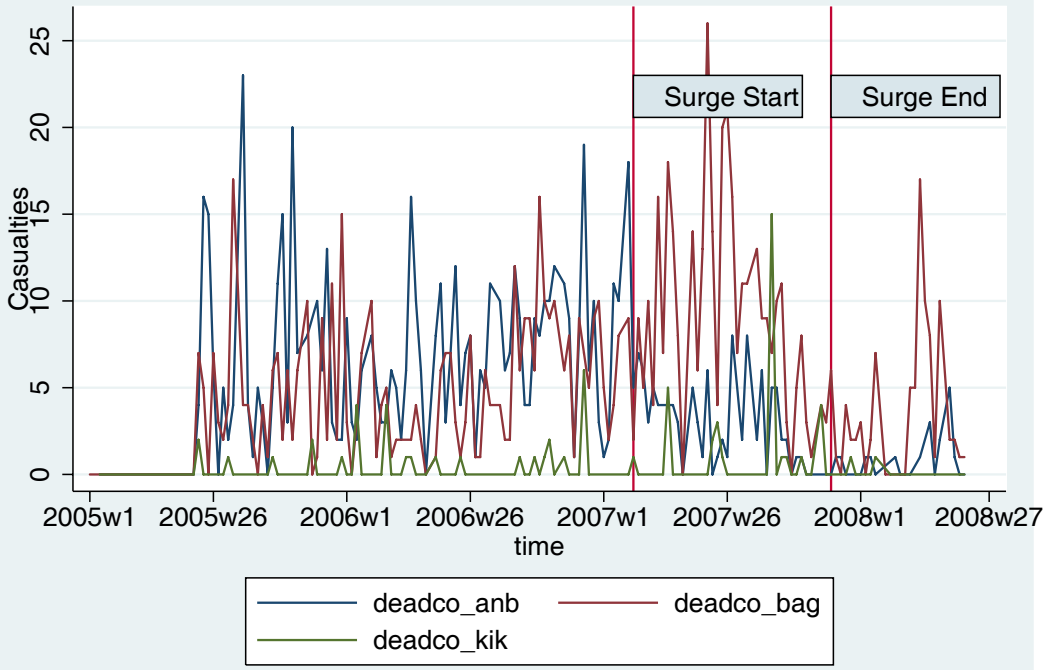
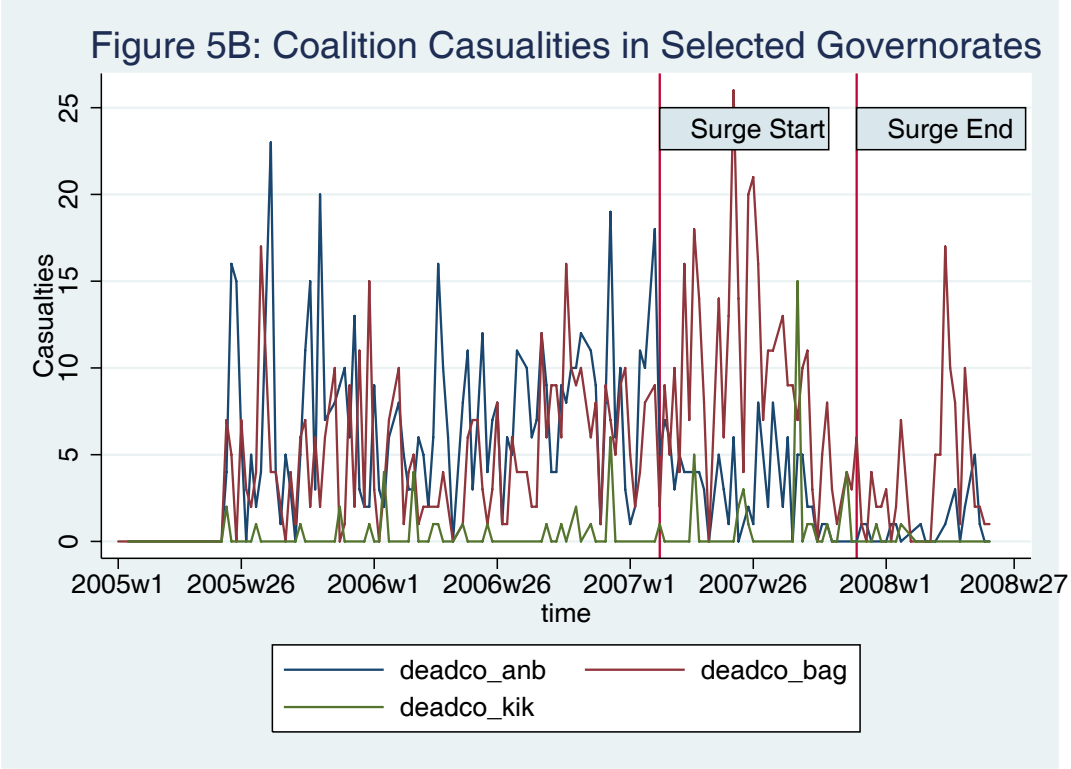


Figure 5A: Iraqi Casualities Across in Selected Governorates





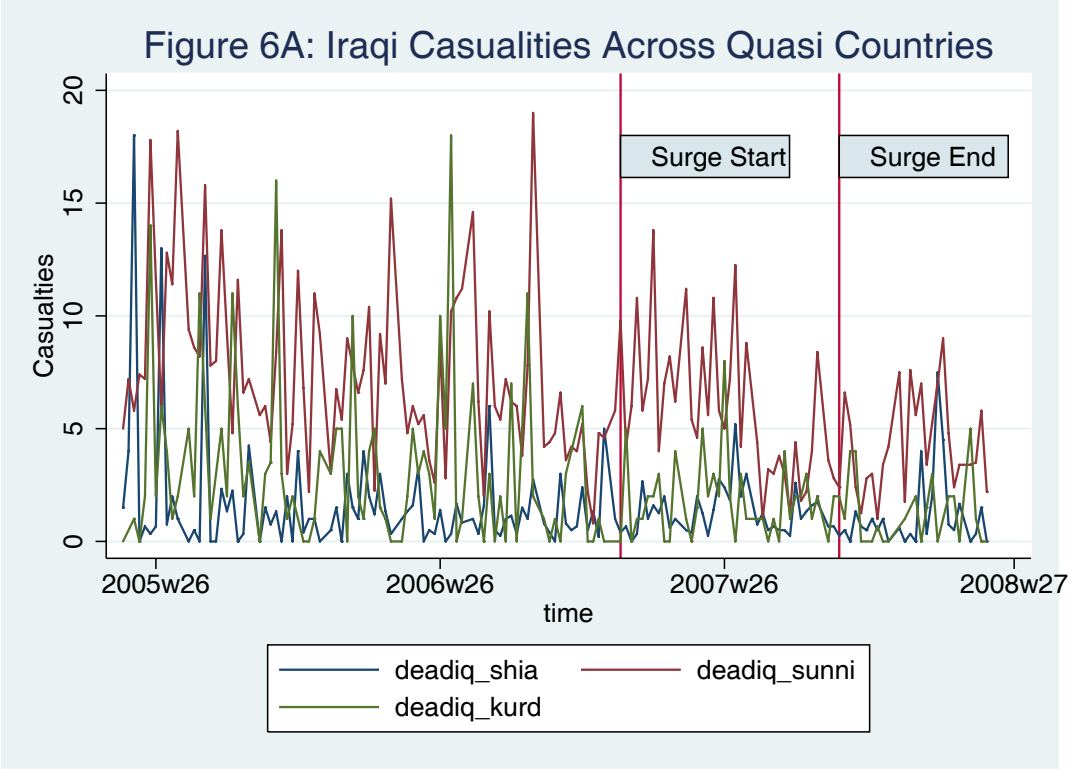


Figure 6B: Coalition Casualities Across Quasi Countries Over Time

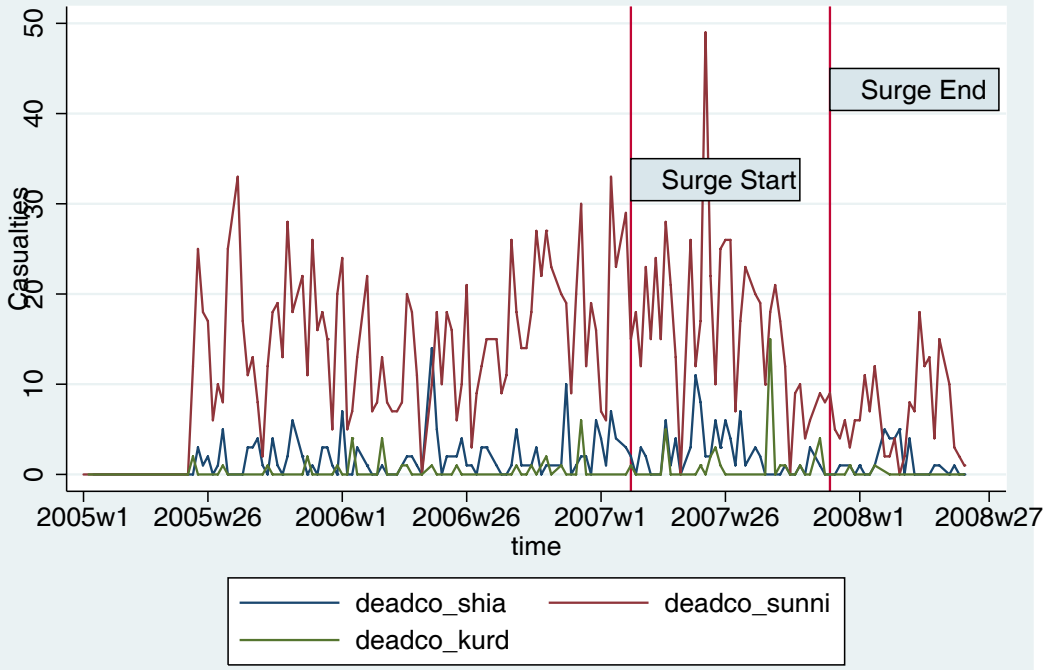
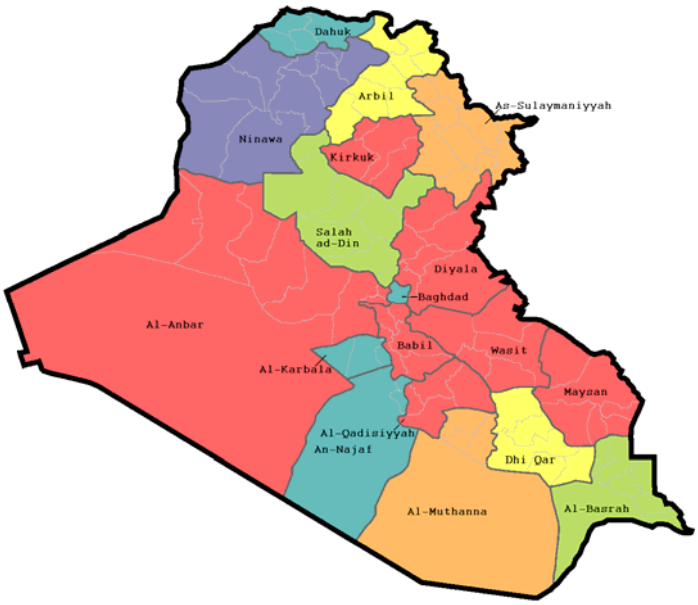
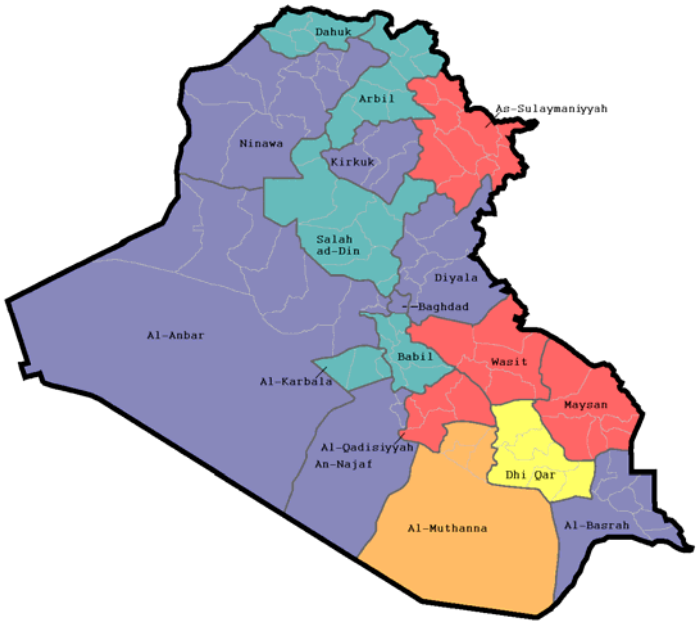


Figure 7: Price Dispersion Pre- & Post-Surge by Governorate



Pre-Surge
(June 2005 – March 2007)

Post-Surge
(November 2007 – April 2008)



During Surge
(March 2007 – November 2007)

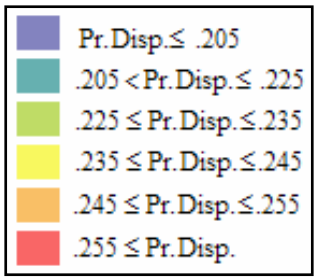
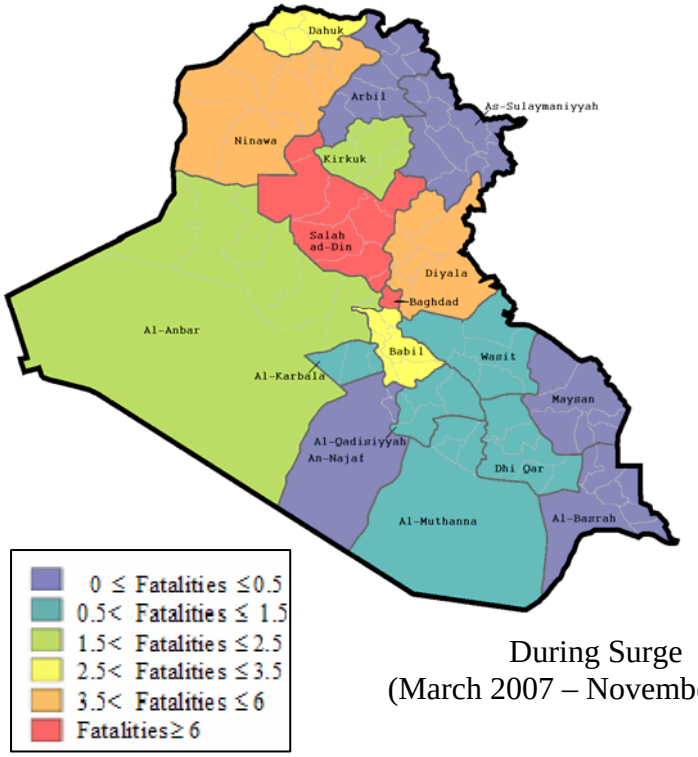


Figure 8: Mean Iraqi Security Forces (ISF) Weekly Fatalities Pre- & Post Surge by Governorate

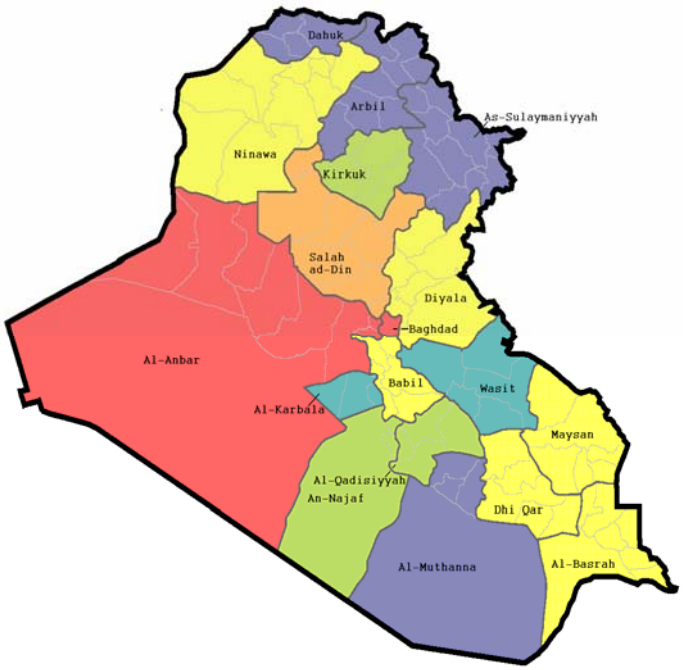
Pre-Surge
(June 2005 – March 2007)

Post-Surge
(November 2007 – April 2008)

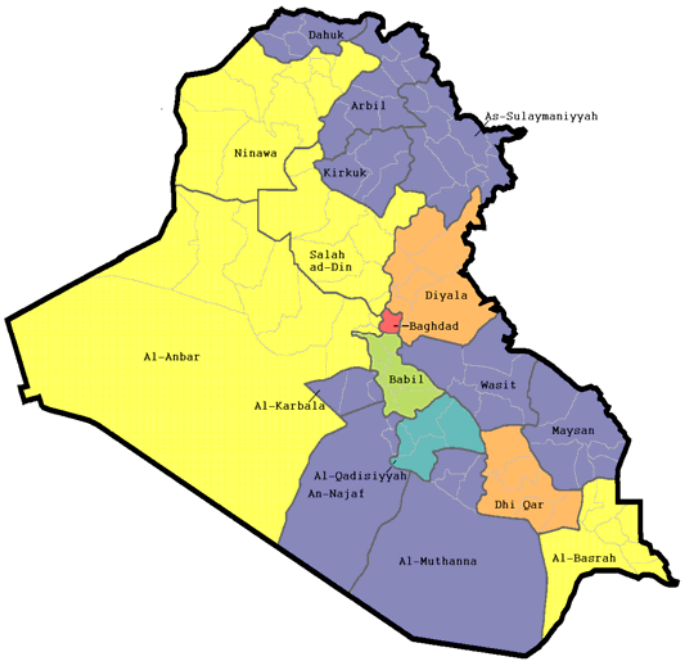


During Surge
(March 2007 – November 2007)

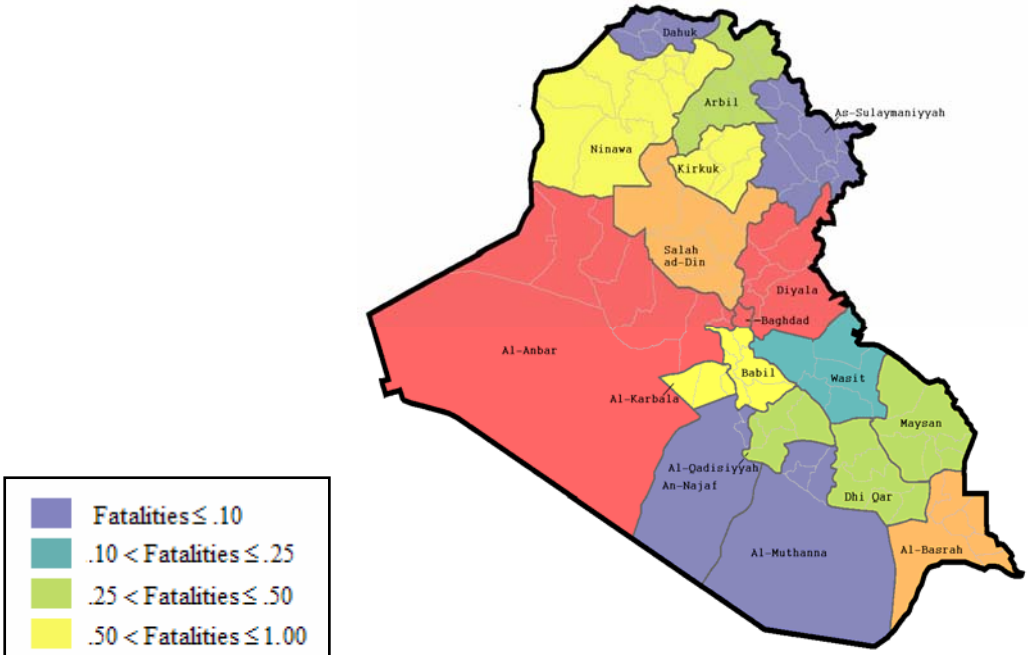
Figure 9: Mean US Weekly Fatalities Pre- & Post Surge by Governorate



Pre-Surge
(June 2005 – March 2007)



Post-Surge
(November 2007 – April 2008)



During Surge
(March 2007 - November 2007)