Organizational Structure, Police Activity and Crime*

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Abstract

We examine the consequences of an organizational reform in Israel that transferred the responsibility for housing arrestees from the Police to the Prison Authority. Using the staggered introduction of the reform in different regions of the country, we document strong evidence that this organizational change led to an increase of 11 percent in the number of arrests and to a decrease of 4 percent in the number of reported crimes, with these effects concentrated in more minor crimes. The reform also led to a decrease in the quality of arrests, measured by the likelihood of being charged following an arrest. These findings are consistent with the idea that the reform externalized the cost of housing arrestees from the Police's perspective, and therefore led the Police to increase its activity against crime.

JEL classification: H10; K14; K40; L30

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1 Introduction

To enforce the law and prevent crime, the state must investigate crimes, adjudicate criminal cases, and house criminals upon conviction. These functions are typically undertaken, respec-

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tively, by three separate agencies: the Police, the Court and the Prison Authority. However, these functions may be organized in a different manner. The investigative and adjudicative functions may not be independent of each other, as in the case of inquisitorial (rather than adversarial) legal systems, where the court is actively involved in investigating facts. Likewise, the investigative function and the function of housing criminal upon conviction may not be independent of each other, as in the case of military prisons, which are often operated by the military police. How do the organizational boundaries between law enforcement agencies affect their activities and crime?

To address this question we investigate the consequences of an organizational reform that transferred the responsibility for housing arrestees from the Police to the Prison Authority in Israel, thereby adjusting the organizational boundaries between the two agencies. Before the reform, arrestees were housed either at local police stations or at regional jails controlled and managed by the Police. After the reform, arrestees were no longer housed at police stations, and the control over regional jails was transferred to the Prison Authority along with the personnel working at these jails.

Theoretically, what should be the consequences of the organizational reform we investigate? We assume that the Police's objective is to minimize crime subject to various contsraints, including a budgetary constraint. The transition of responsibility for arrestees from the Police to the Prison Authority externalizes both the financial and the non-financial cost of housing arrestees from the Police's perspective. It should therefore result in an increase in the number and duration of arrest. Furthermore, if the police chooses optimally which crimes to pursue, focusing first on more severe crimes and arrestees that are more likely to be charged, then the increased number of arrests following the reform should be concentrated in relatively minor crimes and in arrestees that are less likely to be charged. Lastly, an increase in the number of arrestees should lead to a decrease in crime as more criminals are held under arrest. This effect should be more significant in relatively minor crimes that the Police did not pursue before the reform.

The organizational refrom we investigate has general implication, but it is also of particular relevance to a reform that was undertaken in California in October 2011. That reform, known as California's Corrections Realignment Plan, shifted responsibility from the state to

counties for the custody, treatment, and supervision of individuals convicted of specified crimes. That reform was in the opposite direction to the reform we investigate, since instead of relieving local police of the responsibility for housing arrestees, as in the case of the reform we consider, the reform in California imposed on local police an additional responsibility for some prisoners.[1]

In our empirical analysis we use individual-level administrative data on the universe of arrests undertaken in Israel, as well as detailed data on reported crimes. Our empirical strategy relies on two important aspects of the organizational reform. First, the reform can be considered exogenous to police activity and crime because the decision to implement the reform was a direct consequence of a surprise escape of a notorious serial rapist from the hands of the Police. Second, our analysis exploits the staggered timing of the reform across geographical regions of Israel, starting in April 2007 and ending in January 2008.

The research design and the data we use enable us to identify the effects of the reform on various measures of police activity and crime. We begin by investigating how the reform influenced the number and duration of arrests. Figure 1 shows the total number of arrestees before and after the control over jails was transferred from the Police to the Prison Authority, using the date of the transition in each region as time zero. The figure indicates that following the reform there was a large increase in the total number of arrestees held in custody each week. Panel data regression estimates further indicate that the increase in the number of arrestees can be decomposed into an 11 percent increase in the number of arrests and a 38 percent increase in the duration of arrests.

A central strength of our dataset is that it enables us to investigate the impact of the reform on a quality measure of police activity. We assess quality according to the likelihood of an arrestee being charged. This seems a natural measure of arrest quality, since arrests can be undertaken only when there is probable cause, i.e. a reasonable belief that the suspect has committed a crime. Thus, the likelihood that an arrestee will be charged reflects the threshold level of probable cause that the Police sets for undertaking arrests. Our regression estimates imply a reduction of 2 percentage points in the likelihood of an arrestee being charged following

[1]For more details on the Californian realignment reform, see `http://www.calrealignment.org`, The Economist - `http://www.economist.com/node/21555611` and The New York Times - `http://www.nytimes.com/2011/10/09/us/california-begins-moving-prisoners.html`.

the reform. Given the eleven percent increase in the number of arrests, back-of-the-envelope calculations suggest that individuals arrested after the reform were 20 percentage points less likely to be charged compared with individuals who were arrested before the reform. These findings are consistent with the idea that the Police pursued suspects that are less certain to be charged following the reform, and relates to the theoretical literature on the effect of public sector reforms on service quality (Hart, Shliefer and Vishny (1997)).

We also examine the effect of the reform on the severity of crimes for which arrests were undertaken. We do this in two different ways. First, we measure a crime's severity using the maximum possible prison time associated with it. Our regression estimates suggest a reduction of 6 percent in the average maximum possible sentence of arrestees following the reform. Given the increase of 11 percent in the number of arrests, back-of-the-envelope calculations suggest that, relative to the original population of arrestees, individuals arrested after the reform were arrested for crimes whose maximum possible sentence was, on average, 60 percent lower. Second, we look at the composition of arrests, focusing on three categories of crime that account for 80 percent of arrests: public order, property, and bodily harm. We find that the increase in the number of arrests was driven by an increase in arrests for crimes in the less severe categories of public order and property rather than in the more severe category of bodily harm. These findings are consistent with the idea that the Police pursued more minor crimes following the reform.

Our final analysis examines the impact of the reform on reported crimes. Regression estimates suggest that the reform led to a reduction of 4 percent in crime. This reduction is comparable in magnitude to the reduction in crime achieved following a 10-percent increase in the number of policemen, found in other studies (Levitt (1997), DiTella and Schargrodsky (2004), Klick and Tabarrok (2005), Evans and Owens (2007), Draca, Machin and Witt (2011)). Focusing on the three categories of crime mentioned above, we find that the reform led to a decrease in property and public order crimes, while it had no effect on bodily harm crimes. These findings lend further support to our conjecture that the reform enabled the Police to pursue relatively minor crimes, while had little effect on more severe crimes.

The theoretical literature on the boundaries of the firm has established that organizational structure has important implications for economic outcomes (Klein, Crawford and

Alchian (1978), Williamson (1985), Grossman and Hart (1986)). The empirical literature, however, has focused mostly on the determinants of integration decisions, with only few studies examining the effects of vertical integration (see, e.g., Mullainathan and Scharfstein (2001), Afendulis and Kessler (2007), Baker and Hubbard (2003) and Forbes and Lederman (2010)). In their review of the literature on vertical integration, Bresnahan and Levin (2012) write that "in a very few cases, an attempt is made to link the integration decision to economic outcomes". Studying public sector agencies is particularly important because traditional market mechanisms, such as prices and side payments, which can be used to align incentives are usually not applicable to the public sector.

Following Becker (1968), the literature on the economics of crime has investigated how different factors affect crime, including police (e.g. Levitt (1997), DiTella and Schargrodsky (2004), Klick and Tabarrok (2005), Evans and Owens (2007), Draca et al. (2011)), incarceration (e.g.Levitt (1996), Drago, Galbiati and Vertova (2009)) and the length of imprisonment (e.g. Lee and McCrary (2009), Kuziemko (2011), Abrams (2012)). Our study demonstrates that the organizational structure of law enforcement agencies should also be considered an effective policy instrument in the fight against crime.

The remainder of the paper is organized as follows. Section 2 provides institutional background about the organizational reform, describes the data we use and discusses our empirical strategy. In Section 3 we present our results. In Section 4 we discuss the results and in Section 5 we offer concluding remarks.

2 Setting, Data and Empirical Strategy

2.1 The Reform in Israeli Jails

In Israel, the Prison Authority and the Police are independent national agencies operating under the Ministry of Public Security. The main duties of the Israeli Police include crime prevention, traffic control and the maintenance of public order. The Israeli Police is responsible for investigating virtually all types of crimes, and in most cases police prosecutors decide whether to prosecute a suspect.

According to Israeli law, police officers can detain a suspect for up to 48 hours. After

48 hours the Police must bring the arrestee to court. At that point, if the suspect is not charged and the investigation continues, the Police may ask the Court to extend the suspect's arrest. The Court will do so if it thinks that a freed suspect is likely to interfere with the investigation, escape, or constitute a danger to the public. After the suspect is charged the Police may ask the court that the suspect remain under arrest until the trial is completed. The Court approves such request when the suspect is charged with a severe crime (such as drug trade crime, violent crime, crime punishable with life in prison). The Court also approves such requests if it thinks that a freed suspect is likely to interfere with the trial, influence witnesses, or constitute a danger to the public. In some cases, the arrestee be confined to house arrest rather than to a jail, or released on bail.

During the years 2007 and 2008 Israel undertook a large reform in the handling of arrestees and the management of jails. Prior to the reform, the Police was responsible for the transportation and the housing of arrestees. Arrestees were detained either in police stations or in jails that the Police operated and controlled. The Police was also responsible for transporting arrestees from jails to courts and back. When suspects were convicted, they were moved to prisons, which are controlled by the Prison Authority. Under the new arrangement, the Police was no longer responsible for housing arrestees or transporting them. Jail facilities were handed over "as is" to the Prison Authority, and arrestees were no longer detained at police stations (except for a few hours). Twice a day, the Prison Authority's transportation unit would pick up new arrestees from police stations and take them to jails or to courts.

As part of the reform, all police personnel working in jails were transferred to employment under the Prison Authority. Furthermore, the police's budget associated with the management of jails and the handling of arrestees was fully transferred to the Prison Authority. For each region where the reform took place the Police and the Prison Authority signed a very long contract, detailing precisely the transfer of manpower, budget, facilities and equipment from the Police to the Prison Authority. To illustrate, according yo the contract for Israel's southern region the Police will transfer to the Prison Authority 121 employees and the yearly budget associated with their salaries of 19.36 million NIS (New Israeli Shekels), a maintenance yearly budget of 4.35 million NIS, 7 commercial vehicles and their associated yearly operational budget of 0.77 million NIS, and 2 trucks and their associated yearly operational budget

of 0.22 million NIS. The contracts go on to describe in extreme detail the equipment in each jail that the Police will hand over to the Prison Authority. To illustrate, the contract for Israel's southern region includes among the detailed equipment that will be handed over to the Prison Authority the following: 52 guns, 70 mattresses, 170 blankets, 50 pairs of sock, 35 prayers books and one ram's horn (used on the Jewish holiday of Rosh Hashanah). Reflecting the reform, total Police manpower and total Police budget decreased during this period.

Figure 2 illustrates the change made by the reform. The reform did not alter the basic process that criminals go through, i.e., being arrested and sent to jail, then upon conviction being sent to prison. What has changed is how the different stages of this process are divided between the Police and the Prison Authority. Before the reform, responsibility for a criminal was transferred from the Police to the Prison Authority only upon conviction. Following the reform, the transfer occurs when an arrestee is sent to jail.

What led to this organizational reform? On November 24th 2006 a notorious serial rapist named Benny Sela escaped from police custody while on his way to court. Immediately following his escape a nationwide manhunt was launched, and a committee was appointed to investigate the circumstances leading to it. The committee submitted its recommendations on December 7th 2006, a day before Benny Sela was recaptured. The committee's main recommendation was the transfer of responsibility for jails and arrestees' transportation from the Police to the Prison Authority.[2] The idea was that unlike the Police, the Prison Authority specializes in handling the incarcerated, and therefore if it is responsible for arrestees such an escape will not occur again. That the comparative advantage of the Prison Authority in handling the incarcerated is the reason for the reform is explicitly stated in section 1(b) of each of the regional contracts between the Police and the Prison Authority noted above.

The committee also made a recommendation as to the order for the rollout of the reform in the different regions of Israel. This order was determined based on the readiness of the Prison Authority in each region to accept the new responsibility for arrestees. Importantly, to the best of our knowledge no factor related to police activity was considered in determining the rollout of the reform. The Minister of Public Security adopted the committee's recommendations and the implementation of the reform across Israel was scheduled to take place gradually

[2]See the report (in Hebrew) at `http://mops.gov.il/Documents/Publications/Reports/YaronCommittee.pdf`.

throughout 2007 and early 2008. The different police regions and the timing of the reform in each region are shown in Figure 3. As will be further discussed in Section 2.3 our identification strategy relies on this staggered rollout.

2.2 Data

We obtained from the Israeli Police full data on every arrest undertaken in Israel between September 2006 and September 2009. These data cover 153,960 arrests and 95,521 arrestees. For each arrest we know the arresting unit and the date of arrest. We also know the duration of each arrest, i.e. the time the person sat in jail (excluding time spent in house arrest). For each arrest we know the specific type of offense that led to the arrest, and the maximum sentence that can be imposed for the offense. Additionally, we know whether the arrestee was charged following the arrest. Lastly, for each arrestee we have demographic information (age, gender, marital status and ethnicity) as well as an anonymous identification number.

In addition to the arrest data we also have full data on each of the nearly 834,000 crimes reported to the police during the same time period. For each crime reported we know the date the complaint was filed, the type of crime, and the location where it was reported. The use of the number of reported crimes as a measure of crime is standard in the economic literature on crime. In Table 1 we present descriptive statistics of the outcome variables, constructed at the week-region level using the individual level data.

To get a general sense of the effects of the reform on the number of arrests, on the mean duration of arrests and on the number of reported crimes, we calculated, for each region, the number of arrests, the mean duration of arrests (in days) and the number of reported crimes in the six months before and after the organizational reform. We then averaged these values across the five regions, using for each region the date of the organizational reform in that region as time zero. The results of the calculation, in 2-week bins, are presented in Figure 4. The figure shows that the organizational reform led to an increase both in the number of arrests and in their duration, and to a decrease in the number of reported crimes. The effect of the reform can also be graphically seen in Figure 5, in which we separately plot a time-series of the number of incarcerated arrestees in each region. [3]

[3]These figures also suggest that before the reform was implemented the Police faced capacity constraints in the southern and the central regions.

2.3 Empirical Strategy

We use a standard differences-in-differences research design, exploiting the gradual transfer of responsibility from the Police to the Prison Authority to study the effects of the organizational reform. Our baseline specification is as follows:

$$y_{rt} = \alpha + \beta \times Post_{rt} + \gamma_r + \delta_t + \epsilon_{rt} \tag{1}$$

where y_{rt} is the outcome variable of interest in region r in week t. The dummy $Post_{rt}$ assumes the value one in regions and weeks in which the transfer of control over jails has already taken place. γ_r represents regional fixed effects, which control for time-invariant differences across regions. To account for the volatility of criminal activity we also include δ_t - weekly fixed effects. Finally, each observation is weighted according to the population size of its corresponding region.

This specification allows us to estimate the correlation between the implementation of the organizational reform, reflected in the variable $Post_{rt}$, and the outcome variables conditional on time and regional effects. The difference-in-difference approach implies that we are comparing the impact of the reform in one region to its impact in other regions where the reform has not yet taken place. For this equation to have a causal interpretation, the timing of the organizational reform and the order of the rollout need to be independent of unobservables that directly affect the dependent variables. Indeed, as indicated above, the decision to implement the reform and, hence, its timing were a direct consequence of the escape of a serial rapist in November 2006. Furthermore, the order in which the responsibility over jails was transferred to the Prison Authority was determined according to the readiness and the operational capabilities of the Prison Authority in each region, and not based on factors relating to police activity. In Section 3.5 we also conduct a formal test that validates the independence of outcomes from the order of the rollout of the reform. Thus, we do not believe that the order of the rollout constitutes a threat to the identification.

In what follows, we study the effect of the reform on four groups of outcome variables and also conduct the analysis for each of the main categories of crime.

1. Cost measures for arrests - the number of arrests and the mean arrest duration;

2. Quality of arrests - the share of arrestes charged;

3. Severity of arrests - the average maximum possible sentence associated with the crimes for which arrests were made, and the composition of arrests (categories of crime);

4. Crime - the number of criminal files opened by the Police.

3 Results

3.1 Number of Arrests and Mean Arrest Duration

The organizational reform externalized the costs of housing and transporting arrests from the Police to the Prison Authority. These costs include both financial and non-financial costs of handling arrestees (e.g., food, gasoline, hassle and managerial time). Assuming that the Police's objective is to minimize crime subject to its budgetary constratint, we expect that the number and duration of arrests will increase after the reform.[4] As can be seen in Table 2, this prediction is supported by the regression analysis. In columns (1) and (2), we focus on the effect of the reform on the number of arrests, in levels and logs, respectively. We find that the reform led to an increase of 27.8, or 11.1 percent, in the average number of weekly regional arrests. Columns (3) and (4) consider the effect of the reform on arrest duration, also presented in levels and logs. Our findings suggest that the reform led to an increase of 8.8 days, or 38.5 percent, in mean arrest duration. These effects are statistically and economically significant, and indicate a large effect of the organizational reform on police activity.[5] Our finding that arrest duration increased after the reform suggests that the Police requested longer arrest periods from the court following the reform, and that the courts approved these requests. In the Appendix we present evidence that, as a rule, requests by the Police for longer arrest periods are strongly correlated with court decisions to approve longer arrest periods.

[4] At the end of an arrest, the suspect is either released or charged.

[5] When we use a logarithmic specification we estimate smaller treatment effects compared with the corresponding linear specification. The treatment effects from the logarithmic specifications are 11.1 percent and 38.5 percent. The corresponding effects from the linear specifications are 14.5 percent (= 27.83/192.5) and 55 percent (= 8.8/15.85), where the denominators are taken from the average values presented in Table 1. This is consistent with a greater percentage treatment effect for observations with a lower number of arrests or shorter mean arrest duration, as we verify using quantile regressions.

3.2 Quality of Arrests

By law, the Police can arrest an individual if at the time of the arrest there is probable cause, i.e., sufficient evidence to indicate that the individual has committed a crime. The Police therefore has to set a threshold level of probable cause above which it undertakes an arrest. A natural proxy for the probable cause threshold level that the Police adopts is the share of arrestes charged – our measure of arrest quality. How should this measure of quality be affected by the reform? Following the reform, the Police increased the number of arrests; presumably, they did so by adopting a lower probable cause threshold level. The increased number of arrests following the reform should therefore be concentrated among arrestees that are less certain to be charged, which means we expect to see a smaller share of arrestees being charged.

We estimated Equation 1 using the fraction of arrests that led to charges being filed in each week and region as the dependent variable. Column (1) in Table 3 presents the estimation results. We find that the reform led to a decrease of nearly 2 percentage points in the share of arrests leading to to charges being filed, our measure for arrest quality. To get a better sense of the magnitude of these estimates, we performed a simple back-of-the-envelope calculation and compared the post-reform population of arrestees with the pre-reform population. Given an 11 percent increase in the number of arrests, and assuming that the new population of arrestees is the cause of the change in the share of arrestees being charged, the new population of arrestees was 20 percentage points less likely to be charged than the original population.

3.3 Severity of Offenses and Composition of Arrests

We also examined whether the reform affected the severity of crimes that the Police pursued. Arguably, when the Police incurs lower costs of handling arrestees – as would be expected to occur as a result of the reform – it may choose to pursue types of crimes that it did not pursue previously. In particular, we would expect to observe an increase in the number of less-severe crimes pursued by the Police. We used two approaches to empirically examine this conjecture. First, we used information on the maximum sentence (in months) that could be imposed for each offense. We considered the maximum possible sentence to be a measure of the severity of the offense. Columns (2) and (3) in Table 3 consider the effect of the reform on the average maximum possible sentence for arrestees, in levels and logs, respectively. We

find that the reform led to a decrease of 3 months, or 5.9 percent, in the average maximum possible sentence of arrestees. Our back-of-the-envelope calculations suggest that the average maximum possible sentence of the post-reform population of arrestees was 60 percent lower than that of the original population.

The second approach we used to examine the effect of the reform on the severity of crimes that the Police pursued was to distinguish between different categories of crime. We focused on three categories of crimes that accounted for 80 percent of arrests: public order (34 percent), property (30 percent) and bodily harm (15.5 percent). While public order crimes (e.g. trespassing, disrupting police activity and disturbing the peace, violations of the immigration law) are relatively minor offenses, property crimes (e.g. burglary, robbery, auto theft, "theft from an auto") are more severe. Bodily harm crimes (e.g. murder, assault and aggravated assault) are more severe than the two other categories.

Table 4 presents estimation results of Equation 1 for each of the three crime categories. Columns (1), (2) and (3) show the effect of the reform on the (log) number of arrests in each category. The results indicate that the reform led to an increase of 13 percent in the number of arrests for public order crimes and to an increase of 8.8 percent in the number of arrests for property crimes. The effect of the reform on arrests for bodily harm crimes is statistically indistinguishable from zero. These findings are consistent with our conjecture that the reform enabled the Police to pursue more minor crimes. Columns (4), (5) and (6) show the effect of the reform on (log) average arrest duration, for the three categories of crime. We find that the reform led to an increase in arrest duration for all three categories of crime, including bodily harm crimes.

3.4 Crime

Our final set of results examines the effect of the reform on crime rates. We report the results for the crime regressions in Table 5. In columns (1) and (2) we explore the effect of the reform on the number of crimes. The results, reported in both levels and logs, suggest that the organizational reform led to an average decrease of 33 crimes, or 4 percent, over the week-region pairs. In column (3) we also present the results of an instrumental variable regression that estimated the causal effect of police activity, captured by the total duration of arrests made

in a given week, on the number of crimes reported. To account for the endogeneity of police activity, we use the indicator variable for the reform as an instrument. The implied exclusion restriction is that the reform affected crime only through its effect on the total duration of arrests. Assuming that the exclusion restriction holds, we find that an increase of 10 percent in the number of total days of arrest yields a decrease of 0.8 percent in the number of crimes reported.

We also examined the effects of the reform and of police activity on crime rates in each of the three categories: public order, property, and bodily harm. Table 6 presents the least squares results of Equation 1. We find that the reform led to a decrease of 4.4 percent in the number of public order crimes, and a decrease of 5.9 percent in the number of property crimes. The effect of the reform on bodily harm crimes is statistically indistinguishable from zero. These findings seem consistent with the results of our earlier analysis that indicated that the reform led to an increase in the number of arrests for public order and property crimes, but not for bodily harm crimes. For completeness, we also estimated an instrumental variable regression using the indicator for the reform as an instrument for the (log) total arrest duration. Our instrumental variable estimates presented in columns (2) and (4) in Table 6 indicate that an increase of 10 percent in total arrest duration translates into a reduction of 0.91 percent and 1.1 percent in public order crimes and property crimes, respectively.

It is useful to compare our estimates to findings of other studies examining the effect of police activity on crime. Such studies have found that a 10-percent increase in police activity leads crime rates to decrease by 1.7-3.3 percent (DiTella and Schargrodsky (2004)), 3 percent (Klick and Tabarrok (2005)), or 3-4 percent (Draca et al. (2011)). Thus, according to our reduced-form estimates (column (2) in Table 5), the effect of the organizational reform on crime was approximately equal to the upper bound of the estimated effect found in the literature of a 10-percent increase in police activity.

Our findings regarding the increase in the number of arrestees and the corresponding reduction in crime, particularly in the categories of public order and property crimes, may suggest that the reduction in crime occurred as a result of the incapacitation of criminals. This finding is somewhat different from those of other studies on the relationship between police and crime, which have often emphasized the deterrent role of Police (e.g. Draca et al.

(2011)).

3.5 Robustness

In this subsection we present additional results that demonstrate the robustness of our findings (full results are presented in the Online Appendix). First, we collected monthly unemployment data and yearly data on the share of minority groups and the fraction of young men (age 18-25) in each region's population. These variables undergo very little variation over time, so they are nearly fully absorbed in the regional fixed effects. We verified that our results hold when these variables were included in the analysis. Second, given that the analysis was based on five regions only, we verified that the results were not driven by any single region. We did so by re-estimating the effects of the reform using each subset of four regions. Likewise, the results were also qualitatively similar when we added the West Bank region as a sixth region. We excluded this region from the main analysis because the Police's *modus operandi* in the West Bank is different from that in the other regions of the country. Third, we verified that the results were qualitatively the same when we normalized the dependent variables – number of arrests and number of crimes – by region population size, or alternatively when we assigned equal weights to all the regions instead of weighting them by population size. Fourth, we confirmed that our results would not change when we included region-specific time trends. The inclusion of such time trends accounted for region-specific deviation from the generic time effect.

Furthermore, we verified that the pre-reform crime rates were not associated with the order of the rollout. If, for example, the order in which the organizational reform was implemented was dictated by region-specific crime time trends, then our estimates might have captured those trends rather than the effect of the reform. To analyze this issue, we conducted a placebo test by considering a sample that started on September 1, 2006 and ended on March 31, 2007, i.e., the day before the reform began to be implemented. We then re-estimated our crime regression, defining a fictitious date for the implementation of the reform in each of the regions. We set a fictitious reform date in the first region in which the reform was implemented (Tel-Aviv). The fictitious reform dates for the remaining regions were set to maintain the order of implementation and the relative difference in the time of implementation between regions. In this way, we reproduced the exercise as if the organizational reform had occurred during

the pre-reform period. The results, which are non-significant, are also presented in the Online Appendix. These results validate our empirical approach as they reveal no association between the pre-reform crime dynamics and the order of the organizational reform.

Finally, we tested whether the timing of the change in police activity coincided with the timing of the organizational reform. For this, we conducted a test for a structural break by estimating a series of regressions with fictitious organizational reform dates defined for every month starting from 7 months before the true implementation date of the reform up to 15 months after it. The dependent variable in each regression was the weekly number of arrests. The independent variables were a continuous week variable and its interaction with a variable indicating implementation of the organizational reform. We maintained the order of the reform among regions as well as the time difference between their implementation dates. The structural break date was defined as the date for which the regression R^2 is maximized. We find that the regression R^2s ranges from 0.032 to 0.077, with the largest R^2 estimated in the regression with the actual implementation dates.

3.5.1 Crime Displacement Effects

Our results are potentially driven by spatial displacement effects, which imply that criminal activity is diverted from regions in which the reform has been implemented into other areas where the reform has not yet taken place.[6] If spatial displacement did occur, then our estimates for both arrests and crime rates are potentially biased downward. To test for spatial displacement effects, we focused on the 10,827 individuals who were arrested multiple times during the analyzed time frame, and were arrested at least once before April 1, 2007 (the transition date in the first region). We used the information on the first arrest (performed during the pre-reform period) to identify the "home" region of the repeat offender. If spatial location displacement effects are important then, conditional on being arrested again, we expected that

[6] A different type of displacement is time displacement, which implies that the criminal activity is postponed until the extra police activity levels off is not relevant to our study because of the non-transient nature of the reform we investigate. In addition, studies that exploited terror attacks to identify the effect of terror on crime (i.e. Draca et al. (2011)) emphasized that correlated shocks posed a major concern with regard to identification because terror events have a dislocating impact on the economy and the population. In other words, the concern was that crime rates fell not only due to increased deployment of police forces but also because of other factors (Becker and Rubinstein (n.d.), Gould and Stecklov (2009)). Given that we study a reform that had little effect on the general public in Israel, and in light of the direct evidence we present on arrests, we believe that this concern is not relevant to our study.

the likelihood of being arrested in a different region during the interim period (April 1, 2007 to January 1, 2008) would be greater than the corresponding conditional probability following the completion of the rollout (after January 1, 2008). The idea is that during the interim period, the benefits from diverting efforts to other regions are higher than the benefits of doing so after the full implementation of the reform. Using this approach, however, we do not find evidence for spatial displacement. In fact, conditional on being arrested again, the likelihood of the second arrest being in a different region was higher during the post-rollout period than during the interim period.

4 Discussion

A question that arises with respect to our findings is whether they are mainly driven by a change that affected the Police as an organization (*top-down effect*), or whether the observed patterns were triggered by a behavioral change among individual policemen (*bottom-up effect*). For instance, the larger number of arrests may have been driven either by the lower costs of undertaking an arrest by an individual patrol officer, or alternatively by senior police officers who were actively pushing their subordinates to undertake more arrests and detain arrestees for longer periods of time, given that the responsibility for housing arrestees was no longer the Police's and therefore their managerial costs decreased.

We think that our findings reflect a top-down effect, for three main reasons. First, the fact that arrest duration increased suggests that the effect of the reform was not limited to patrol policemen, who bear the direct cost of arrest, but rather that police investigators and police prosecutors were affected as well. The latter observation supports the idea that the reform had a broad effect on the Police, which is consistent with a top-down effect. Second, during the investigated time period and irrespective of the reform, the commander of a police station was also evaluated according to the total number of arrestes being charged in his or her precinct. In that sense, the reform helped these commanders accomplish their own and the Police's goals. Finally, Police officers we spoke with noted that the direct costs of undertaking arrests for individual police officers did not necessarily decrease after the reform, mainly because the Prison Authority was procedurally much stricter than the Police when accepting arrestees. For instance, the Prison Authority requires the presence of a police officer

while it conducts a thorough health check-up to each new arrestee.

Another question that we have not yet touched upon is whether the reform was desirable from a normative perspective. Although it is difficult to provide a quantifiable welfare measure of the consequences of the reform, we believe it is still important to offer at least some back-of-the-envelope calculations. Let us first consider the direct costs and benefits of the reform. The total annual costs of crime in Israel are estimated at about \$3.5 billion.[7] Thus, a reduction of 4 percent in crime rates amounts to a saving of roughly \$140 million. As Figure 1 illustrates, following the reform the total number of arrestees increased from around 2,500 to 4,000. The average yearly cost of holding a prisoner in Israel, based on the Prison Authority's data, is \$25,000. Thus, an increase of 1,500 arrestees is associated with an increased cost of \$37.5 million. Since the savings are greater than the cost, this simple calculation suggests that the reform was desirable.

However, the former calculation is imprecise in two ways. First, as we showed in our empirical analysis, the reduction in crime was concentrated in the relatively minor crime categories of public order and property, whereas the number of bodily harm crimes did not significantly decrease. Therefore, our estimation of the savings from the reduction in crime, based on the total cost of crimes, may be overstated. Second, to estimate the cost of holding an arrestee we used the average cost of a prisoner. As the marginal cost of holding an arrestees is likely to be significantly lower than the average cost, our estimation of the cost of the increase in the number of arrestees may also be overstated. Furthermore, in addition to considering the direct costs and benefits of the reform, we must also consider the cost of arrests that did not lead to charges being filed. We found that the reform led to a decrease of 2 percentage points in the share of arrests leading to charges being filed. Since following the reform the total yearly number of arrests increased by 7,300 (the weekly average regional number increased by 28), this means that in the year following the reform about 1,500 individuals were arrested but not charged. Arguably, integrating into the welfare calculations the costs incurred as a result of these arrests would make the bottom line of the welfare analysis less obvious.[8]

[7] See the full report (in Hebrew) at
`http://mops.gov.il/Documents/Publications/CrimeDamage/CrimeDamageReports/CrimeDamageReport2008.pdf`

[8] One way to integrate the welfare loss of arresting non-charged arrestees is by using the \$1,000 for 90 days of arrest value of freedom figure offered by Abrams and Rohlfs (2011). Using this value suggests that the total welfare cost of these arrests is in the order of a quarter of million dollars, and therefore it does not change the

5 Conclusion

It is important to understand the relationship between structure and performance in the public sector, not only because this relationship can shape public policy, but also because many market mechanisms that economists often propose are unlikely to apply to public sector agencies. This implies that the consequences of integration decisions within the public sector are potentially far-reaching. In this paper we provide evidence regarding the consequences of an organizational reform in Israel that adjusted organizational boundaries between the Police and the Prison Authority. We find that the reform led to an increase in the number and duration of arrests. At the same time, the quality of arrests, measured according to the likelihood of arrestees being charged, decreased, as did the severity of offenses for which arrests were undertaken. In addition, we find that the effect of the reform on police activity also translated into lower crime rates. Taken together, these results indicate that organizational structure has a substantial effect on police activity and crime and that these effects should be taken into consideration when designing the organizational structure of law enforcement agencies.

Though we focus on law enforcement agencies in this paper, we believe that there are other settings, characterized by comparable underlying forces, to which our findings might apply. In a hospital, for instance, bottlenecks are likely to occur at the interface between the emergency department and internal wards, because the decision whether to accept a patient into the ward is subject to the ward's approval (Mandelbaum, Momcilovic and Tseytlin (2012)). In that sense, our study can help provide insight into how integration of the emergency room and the internal ward would affect hospitalization decisions and consequently public health. Future research using hospital data can shed direct light on this issue.

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conclusion regarding the desirability of the reform.

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Table 1: Descriptive Statistics

	Mean	S.D.	10P	90P
Number of Arrests	192.45	83.77	107	309
Arrest Duration (days)	15.85	9.86	6.53	29.5
Maximum Sentence (months)	74.45	13.73	59.95	91.92
Share Indicted	0.36	0.11	0.24	0.51
Reported Crimes	1041.8	326.8	558	1553

All figures are at the week/region level. "Reported Crimes" refers to the number of crime files opened by the Police.

Table 2: The Effect of the Reform on the Number and Duration of Arrests

Dep. Var:	Number of Arrests		Arrest Duration	
	Level	Log	Level	Log
	(1)	(2)	(3)	(4)
Reform	27.83***	0.111***	8.831***	0.385***
	(9.788)	(0.0357)	(1.807)	(0.104)
Week/Region Fixed Effects	✓	✓	✓	✓
R-squared	0.883	0.911	0.616	0.621
Observations	785	785	785	785

$***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.1$

The unit of observation is a region-week cell. The reform variable corresponds to the dummy variable, which assumes the value one in regions and weeks in which the transfer of control over jails from the Police to the Prison Authority has already taken place. The regression includes also week and regional fixed effects. Observations are weighted by each region's population. Standard errors are robust and clustered by region/month.

Table 3: The Effect of the Reform on the Share of Arrestees Charged and Maximum Sentence

Dep. Var:	Share Charged	Maximum Sentence	
		Level	Log
	(1)	(2)	(3)
Reform	-0.0201**	-2.703*	-0.0527**
	(0.00859)	(1.436)	(0.0208)
Week/Region Fixed Effects	✓	✓	✓
R-squared	0.829	0.605	0.635
Observations	785	785	785

$***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.1$

The unit of observation is a region-week cell. The reform variable corresponds to the dummy variable, which assumes the value one in regions and weeks in which the transfer of control over jails from the Police to the Prison Authority has already taken place. The regression includes also week and regional fixed effects. Observations are weighted by each region's population. Standard errors are robust and clustered by region/month.

Table 4: The Effect on Number and Duration of Arrests - by Crime Category

Dep. Var:	Log Number of Arrests			Log Arrest Duration		
	Public Order	Property	Bodily Harm	Public Order	Property	Bodily Harm
	(1)	(2)	(3)	(4)	(5)	(6)
Reform	0.130**	0.0883**	0.0146	0.353**	0.446***	0.309**
	(0.0548)	(0.0448)	(0.0491)	(0.139)	(0.126)	(0.136)
Week/Region Fixed Effects	✓	✓	✓	✓	✓	✓
R-squared	0.854	0.804	0.740	0.519	0.422	0.453
Observations	785	785	785	785	785	785

$***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.1$

The unit of observation is a region-week-crime category cell. The reform variable corresponds to the dummy variable, which assumes the value one in regions and weeks in which the transfer of control over jails from the Police to the Prison Authority has already taken place. The regression includes also week and regional fixed effects. Observations are weighted by each region's population. Standard errors are robust and clustered by region/month.

Table 5: The Effect of the Reform on Crime

Dep. Var:	Crime		
	Level	Log	Log
	OLS	OLS	2SLS
	(1)	(2)	(3)
Reform	-33.25**	-0.0399***	
	(13.10)	(0.0118)	
Log Total			-0.0804***
Arrest Duration			(0.0258)
Week/Region	✓	✓	✓
Fixed Effects			
First Stage			20.63
F-Stat.			
R-squared	0.982	0.982	0.972
Observations	785	785	785

$***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.1$

The unit of observation is a region-week cell. The number of reported crimes refers to the number of crime files opened by the Police. The reform variable corresponds to the dummy variable, which assumes the value one in regions and weeks in which the transfer of control over jails from the Police to the Prison Authority has already taken place. The regression includes also week and regional fixed effects. In column (3) the reform variable is used an instrument for the log total arrest duration variable. Observations are weighted by each region's population. Standard errors are robust and clustered by region/month.

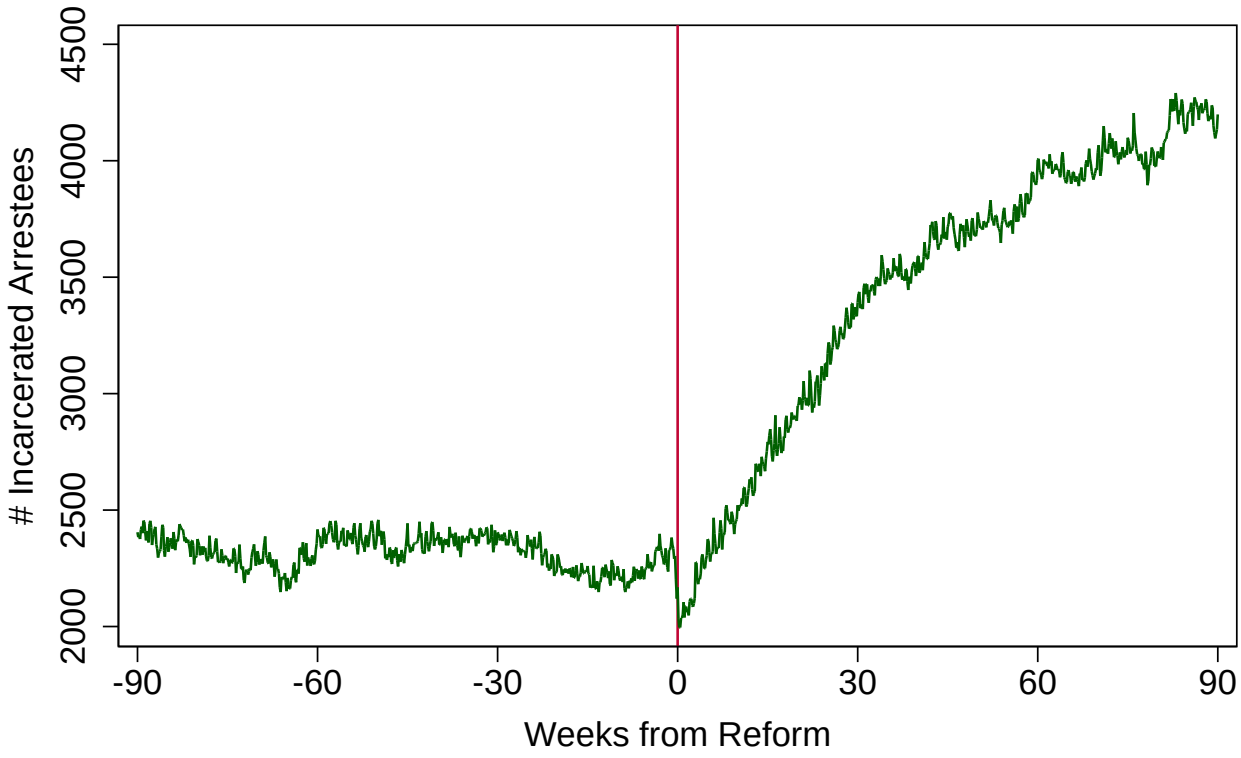
Table 6: The Effect of the Reform on Crime in Different Categories

Dep. Var:	Log Crime					
	Public Order		Property		Bodily Harm	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Reform	-0.0440***		-0.0589***		0.0161	
	(0.0151)		(0.0134)		(0.0193)	
Log Total		-0.0912**		-0.110***		0.0496
Arrest Duration		(0.0402)		(0.0340)		(0.0579)
Week/Region Fixed Effects	✓	✓	✓	✓	✓	✓
First Stage F-Stat.		11.41		16.10		5.087
R-squared	0.948	0.906	0.978	0.932	0.933	0.923
Observations	785	785	785	785	785	785

$***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.1$

The unit of observation is a region-week-crime category cell. The number of reported crimes refers to the number of crime files opened by the Police. The reform variable corresponds to the dummy variable, which assumes the value one in regions and weeks in which the transfer of control over jails from the Police to the Prison Authority has already taken place. The regression includes also week and regional fixed effects. In even columns the reform variable is used an instrument for the log total arrest duration variable. Observations are weighted by each region's population. Standard errors are robust and clustered by region/month.

Figure 1: Organizational Reform and Number of Incarcerated Arrestees



The figure plots the daily number of incarcerated arrestees (the stock of arrestees), aggregated over regions. Week zero marks the date of reform implementation in each region. The horizontal axis covers the 90 weeks before and after the reform. Because the reform date varies across regions, the number of incarcerated arrestees on any given day following the reform is the sum of the numbers of arrestees in the different regions on different dates. There is a small drop in the number of arrestees immediately following the transition due to some difficulties in adjusting to the new structure, primarily in the southern region.

Figure 2: Non-Integrated (left) and Integrated (right) Organizational Structures

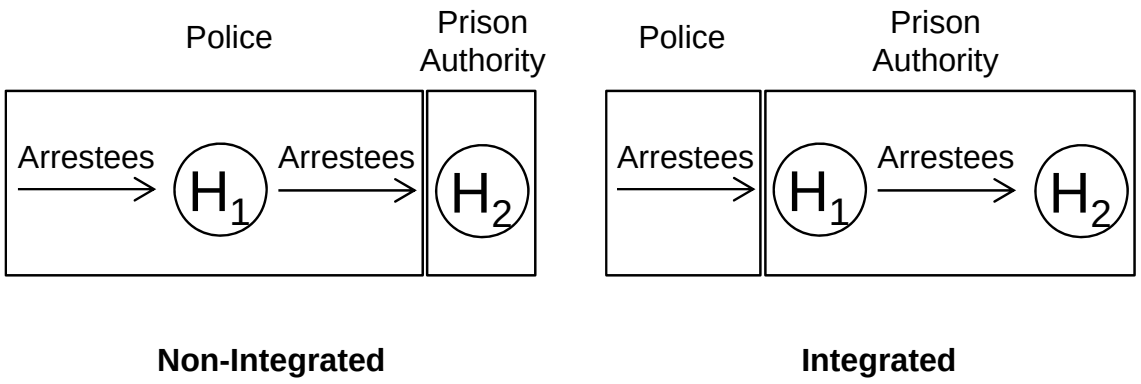
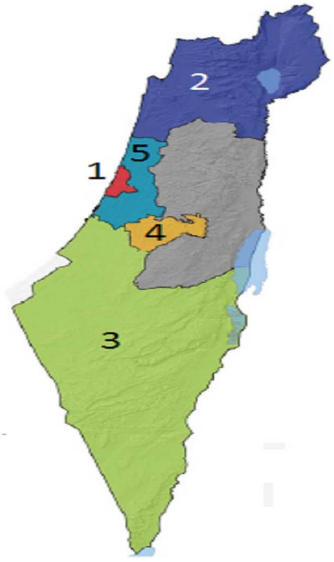


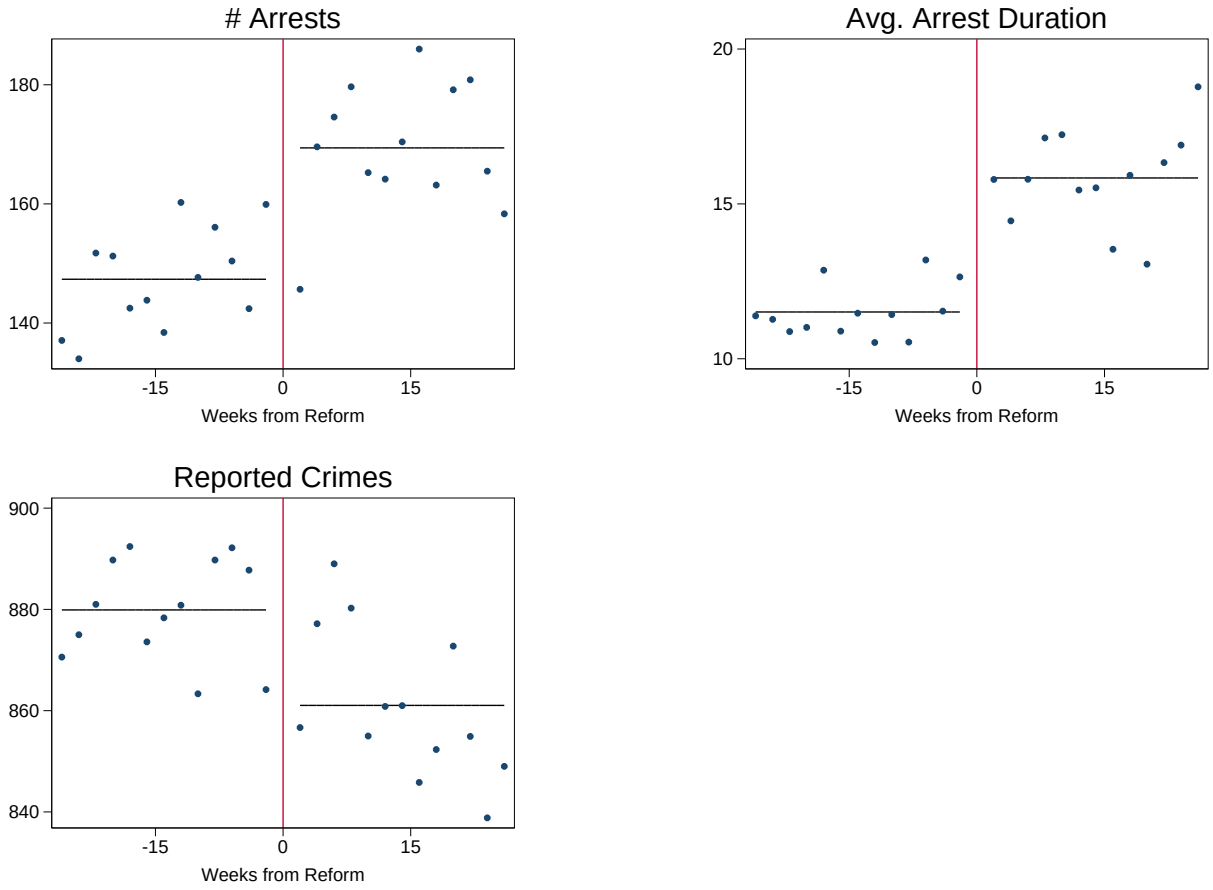
Figure 3: Police Regions and Timing of Reform

	Region	Date
1	Tel-Aviv Region	04/2007
2	Northern Region	06/2007
3	Southern Region	09/2007
4	Jerusalem Region	11/2007
5	Central Region	01/2008



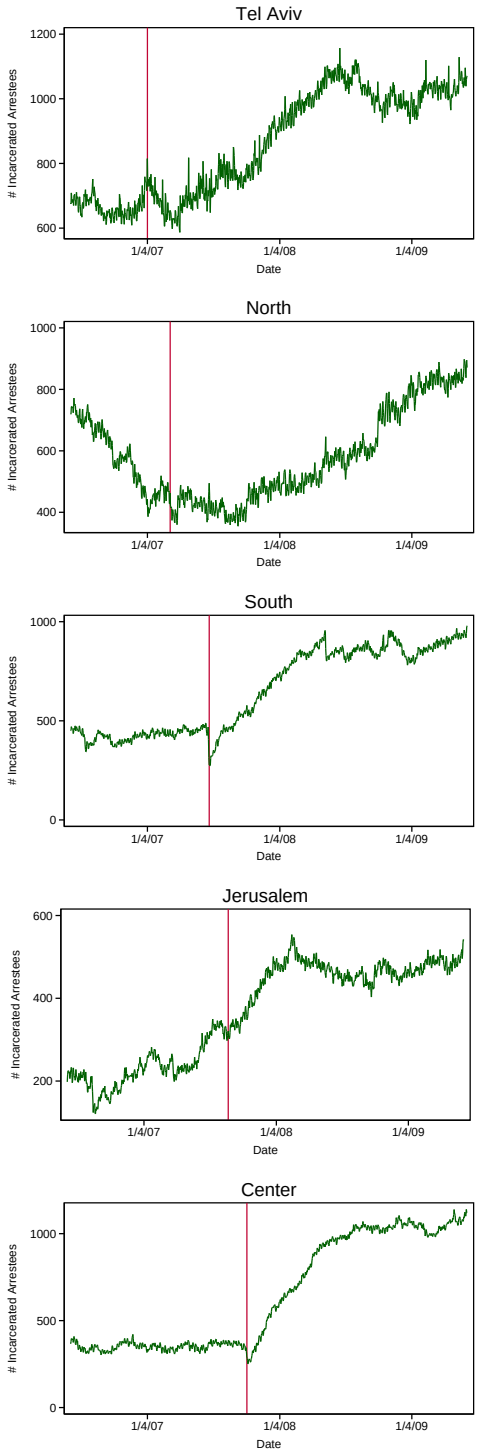
The map represents the five regions of Israel. The table lists the month of reform implementation for each of the regions.

Figure 4: Organizational Reform - Number and Duration of Arrests and Reported Crimes



The figure plots the number of arrests, the mean arrest duration and the number of reported crimes over regions. Each dot corresponds to a time period of two weeks. Week zero marks the date of reform implementation, for each region. The horizontal axis covers the 30 weeks before and after the reform. Horizontal lines represent the average values over the 30 weeks before or after the reform. Since the reform implementation date varies across regions, each dot aggregates values collected on different dates.

Figure 5: Number of Incarcerated Arrestees in Different Regions



Each figure plots the daily number of incarcerated arrestees in different region. The vertical lines mark the organizational reform date. The horizontal axis covers the time period of September 2006 - September 2009.