Deterrent Effect of Penal Sanctions on Economic Crimes: Evidence from a Natural Experiment

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Motivation

- Our study is motivated by two observations on the usage of financial checks in Turkey

(i) Prior to 2012, the act of writing a bounced check could result in imprisonment. However, with the amendments to the check law effective since February 2012, this penal sanction is replaced with less severe administrative fines

(ii) The total number and the total value of the bounced checks started to increase around mid-2011's

The Ratio of Number of Bounced Checks to the Total Number of Checks
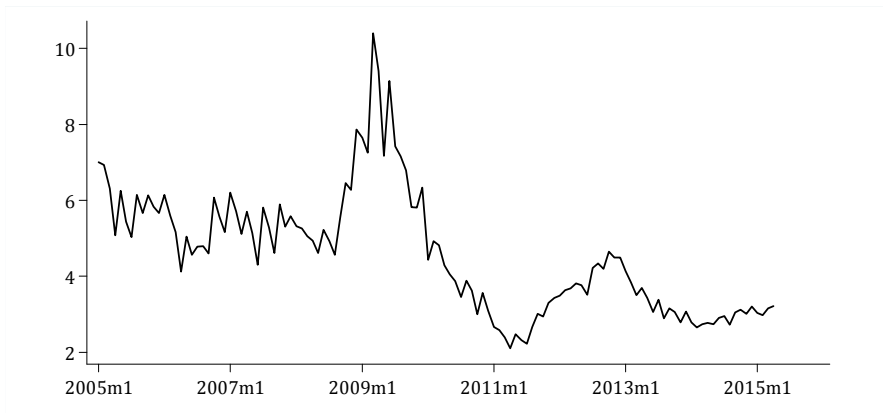
Literature Review

- Empirical literature on the economic theory of optimal punishment (Levitt and Miles 2007; Dominguez et al. 2015; Feess 2015)

- Economic (financial) crimes: Should they be punished by an economic punishment or by an imprisonment?

  - Opponents of imprisonment argue that prison sentences are counterproductive. Imprisoning the debtor deprives him or her of the chance to work and it therefore takes longer before the debt can be repaid
  - Proponents of imprisonment argue that strong penalties such as imprisonment are necessary in order to reduce the cost to society by fostering economic stability

- Babaoglu and Wulf (2015) also analyzes the effect of 2012 amendment to the check law
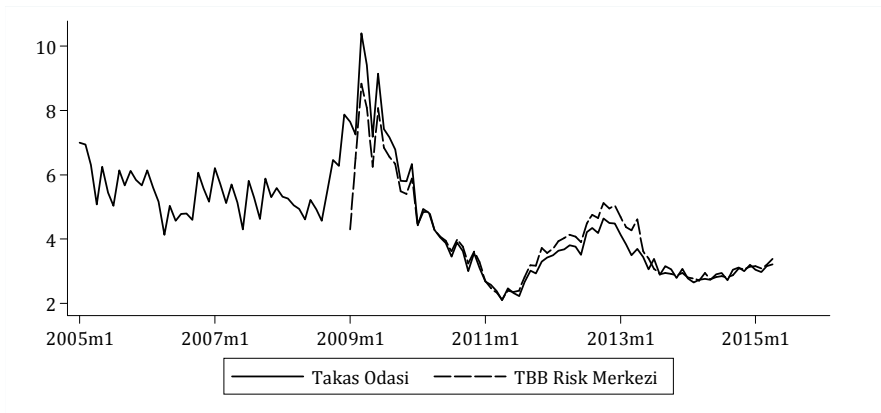
Check Data

- The data on the usage of checks are provided by both 'Bankalararası Takas Odası' and 'TBB Risk Merkezi'

- TBB provides the complete data on checks but covers only post-2009 period

- Takas Odası goes back until 2005 but provides data only on swap checks

Total Number of Checks
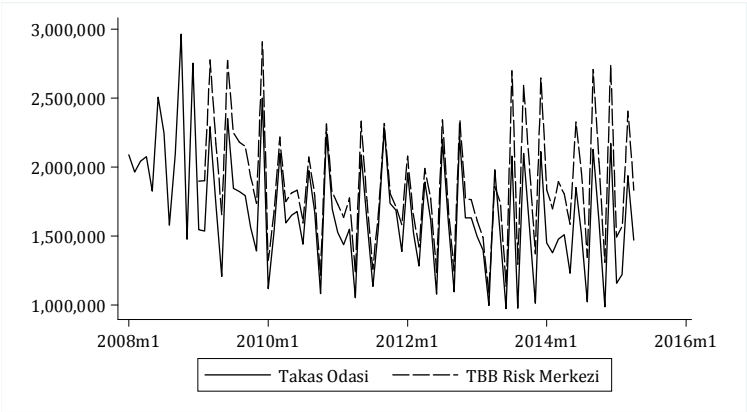
# The Ratio of Number of Bounced Checks to the Total Number of Checks

Empirical Approach

- Test structural changes in the bad checks data

- Investigate whether these changes are due to shifts in the economic environment or due to the change in check law that took effect at the beginning of 2012

Structural Changes in the Ratio of Number of Bounced Checks to the Total Number of Checks

$$tnbc\_tnc = c^n + \varepsilon$$
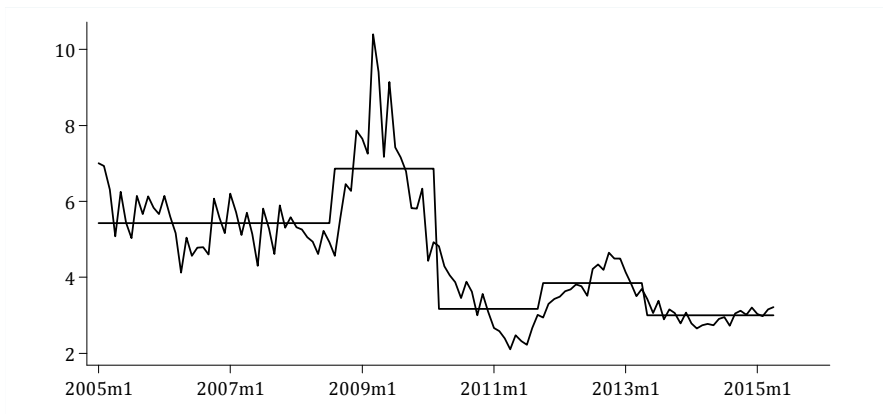
Explainin the Changes in the Data

$$tnbc\_tnc = c^n + \beta X' + \varepsilon$$

- where X is chosen as
    - (i) economic variables
    - (ii) economic variables and a proxy variable for the legal amendment

Economic Fundamentals

- Industrial production index (up to 4 lags)

- Real sector confidence index

- Ratio of non-performing loans

- The total number and value of bounced deeds

- Bist 100 index

- The lag of the endogenous variable

Break Statistics After Controlling for Economic Variables
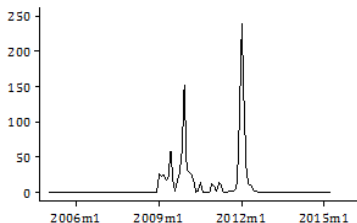
$$tnbc\_tnc = c^n + \beta X' + \varepsilon$$
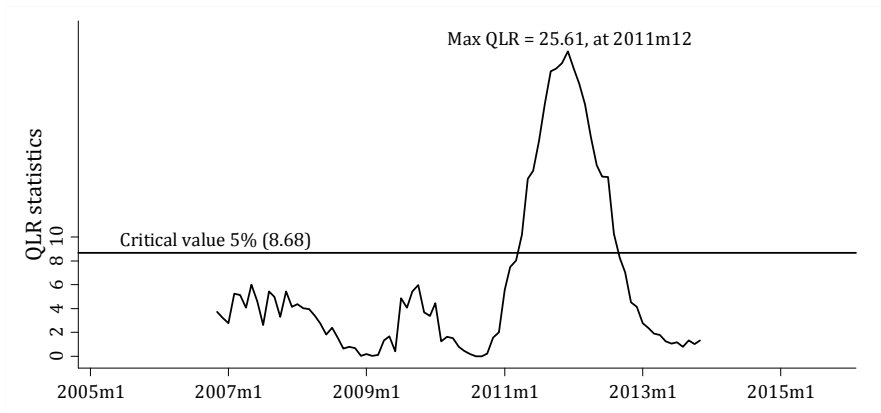
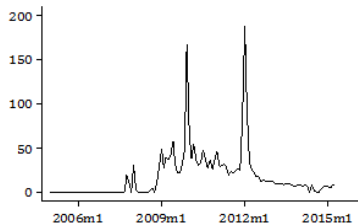# Proxy Variable for the 2012 Legal Change

- The planned amendments are announced well in advance

- Hence, people may decide not to fulfill their obligations for their existing checks

- We use the number of people who are aware of coming change as a proxy for the legal amendment, which is measured by

    - (i) the number of google searches on the legal-amendment-related-terms (Google Trend)

        - Ginsberg vd. (2009), Vosen ve Schmidt (2011), Choi ve Varian (2012), Curme vd. (2013), Preis vd. (2013)

    - (ii) the number of links on the internet (Google Search Engine)
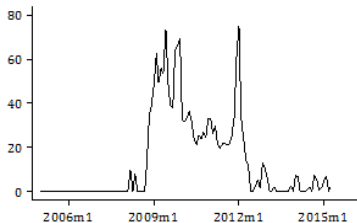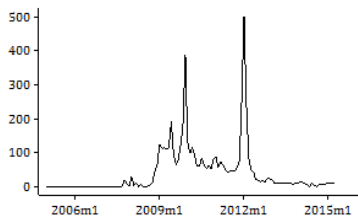
Google Trend

Proxy for the Legal Changes

- Google Trend data has two peaks, and the first one possibly correspondes to another legal change

- To form our proxy variable, we have to remove the searches that are not related with the legal amendment in 2012:2

- In 2011:6 and 2011:7 the number of searches falls to the minumum, even to zero for some terms

- Hence, we use the data from 2010:8 onwards and disregard to previous data

- Finally, we use not the raw but the cumulative volume of google searches as the cumulative volume indicates the number of people who are aware of the coming legal change

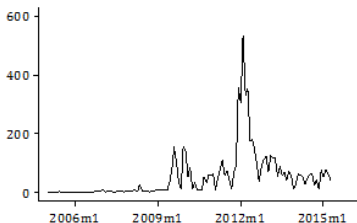$$LC_t^{gt} = G_t + G_{t-1} + G_{t-2} + G_{t-3} + ...$$

Break Statistics After Controlling for Economic Variables and Google Trend

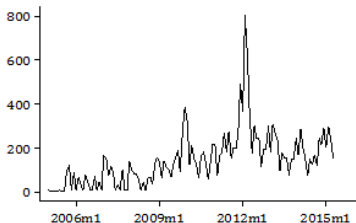$$tnbc\_tnc = c^n + \beta_1 X' + \beta_2 LC^{gt} + \varepsilon$$
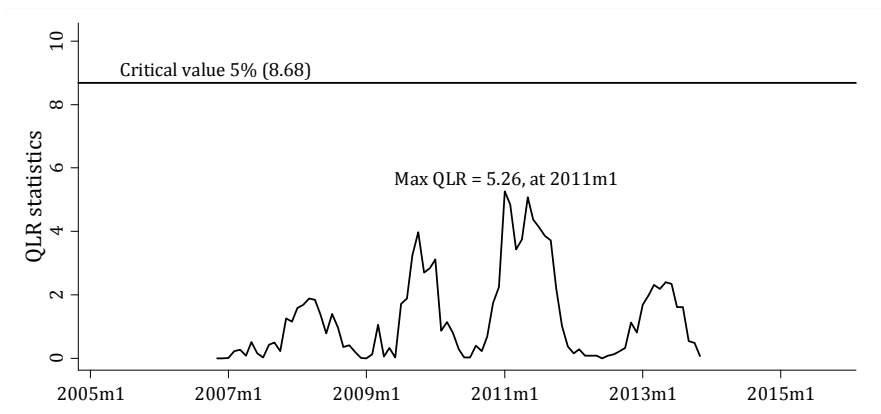
Google Search Engine
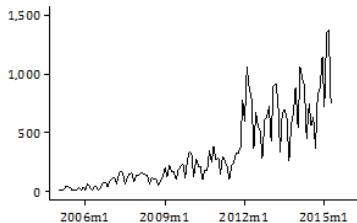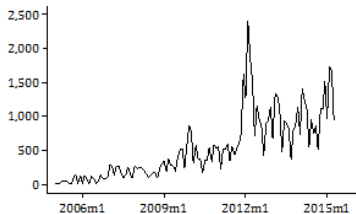

i. Check Law (1)

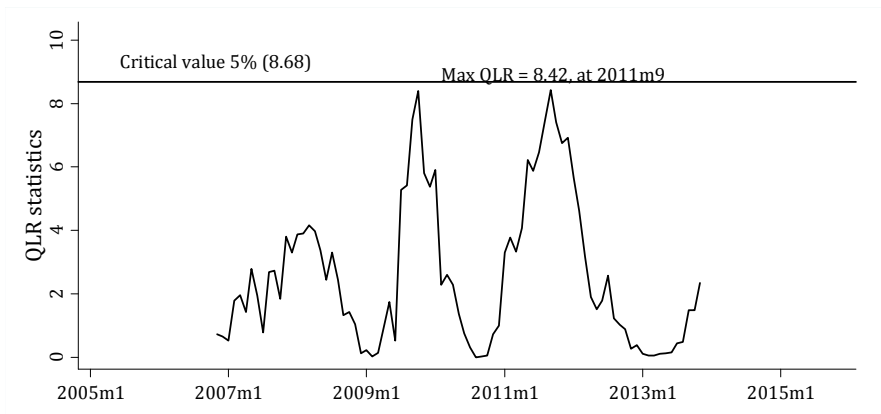ii. Check Law (2)
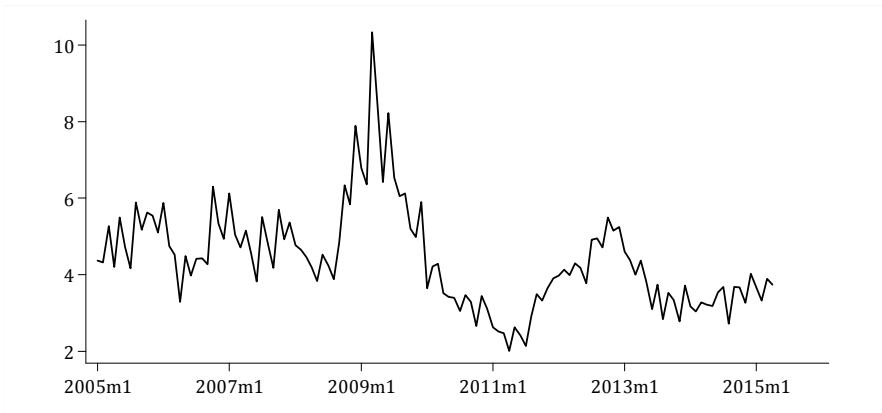
iii. Bounced Check

iv. Total Number of Searches

Break Statistics After Controlling for Economic Variables and Google Search Engine

$$tnbc\_tnc = c^n + \beta_1 X' + \beta_2 LC^{gt} + \varepsilon$$

	The Ratio of Number of Bounced Checks	The Ratio of Number of Bounced Checks
The Ratio of Number of Bounced Checks (1st Lag)	0.218 (2.20)**	0.327 (3.67)***
Google Trend	0.000907 (5.11)***	
Google Search		0.000213 (4.71)***
Industrial Production Index	-0.0198 (-2.51)**	-0.0125 (-1.53)
Industrial Production Index (1st Lag)	-0.0152 (-1.81)*	-0.00830 (-1.01)
Industrial Production Index (2nd Lag)	-0.0199 (-2.08)**	-0.0128 (-1.45)
...		
Real Sector Confidence Index	-0.0120 (-1.59)	-0.0151 (-1.79)*
Total Number of Bounced Deeds	0.0000224 (4.92)***	0.0000164 (3.93)***
Ratio of Non-Performing Loans	-0.00247 (-0.02)	0.0886 (0.75)
Bist 100 Index	-0.0000191 (-3.24)***	-0.0000199 (-3.06)***
Observations	120	120
R^2	0.903	0.893

The Ratio of Value of Bounced Checks to the Total Value of Checks

The Value of Bounced Checks

- Yet, the increase in the value of bounced checks may just be a reflection of an increase in the number of bounced checks

  Value of Checks = Number of Checks ∗ Average Check Value

- Hence, we check if the average value of bounced check is subject to structural changes as well

Break Statistics for the Average Value of Bounced Checks After Controlling for Economic Variables

$$avbc = c^n + \beta X' + \varepsilon$$
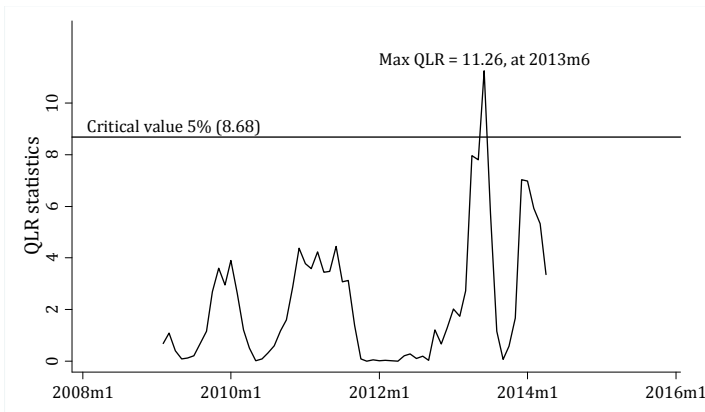
Adaptation Rate to the Amendment in the Check Law

- The ratio of number of bounced checks goes back to pre-2011 levels

- We interpret this as an evidence that the business sector adapted to the amendment in check law. But, what is the speed of adaptation?

- To answer this question empirically, we assume that, each month, some fraction of people adapt to the change in check law (we reduce number of google searches coming from previous months by some percentage)

$$TG_m = G_m + \rho G_{m-1} + \rho^2 G_{m-2} + ...$$

- To find the fraction rate that best explains the data in regressions, we make grid search in the [0,1] interval with steps of 0.01

- We conclude that each month %5 of people adapt to the changes in the check law

Results

- The legal change that took place in 2012 was effective on the number of bounced checks but not on their average value

- Each month %5 of people adapt to the changes in the check law so that the ratio of number of bounced checks to total number of checks in 2013 goes back around pre-2012 levels