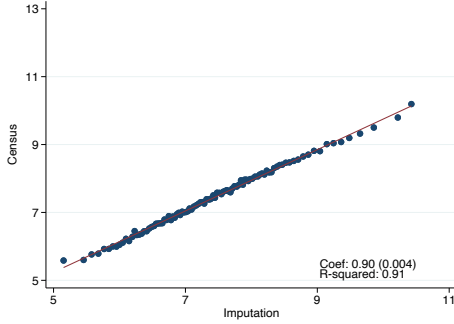


CORRUPTION AND FIRMS
APPENDIX

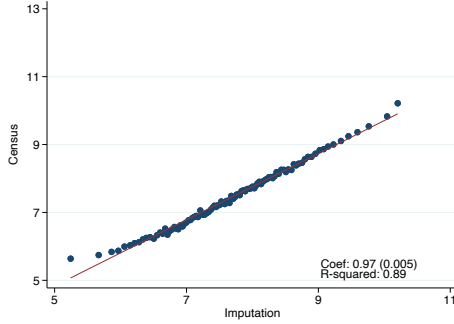
A.1. FIGURES AND TABLES

FIGURE A1

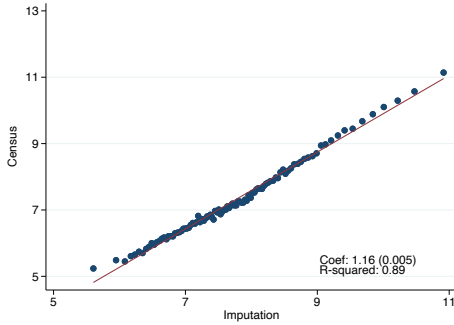
Informality/formality: validating imputation from state - to municipality - level



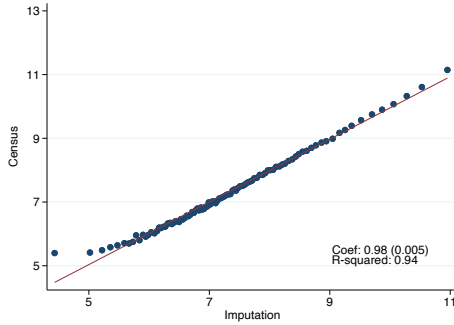
(a) Informal (population shares)



(b) Informal (informality shares)



(c) Formal (population shares)

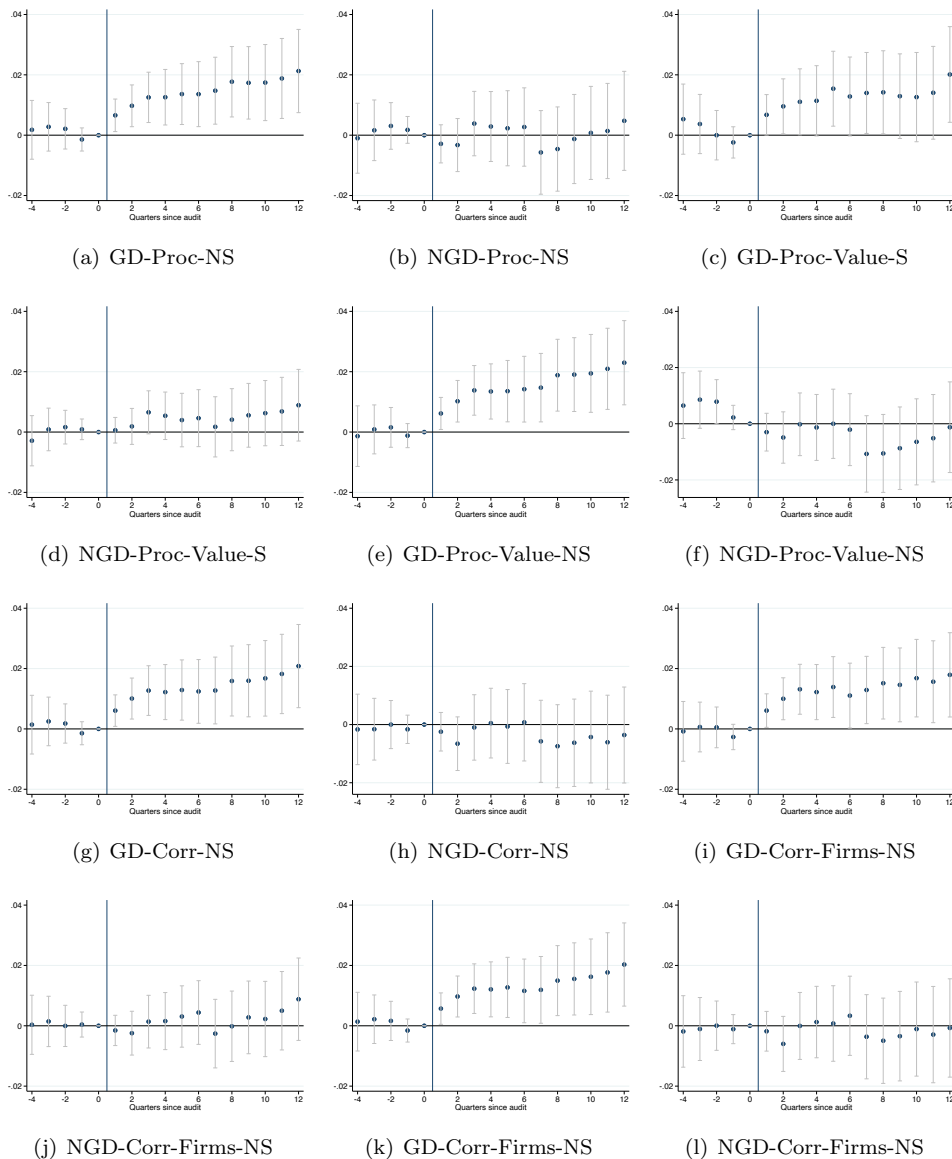


(d) Formal (informality shares)

Notes: This figure reports both the estimated coefficients and the R-squared of the linear regression of the 2010 Decennial Census municipal measures of informal and formal employment (in logarithmic terms) on our imputations of those same measures in the PNAD dataset from state to municipality level. The imputations in Panels A and C are based on population shares, constructed from the annual IBGE data. The imputations in Panels B and D are based on informality shares, constructed from the 2000 Decennial Census. Since PNAD surveys are not conducted in 2010, we conduct this test using the average of the PNAD imputations for 2009 and 2011.

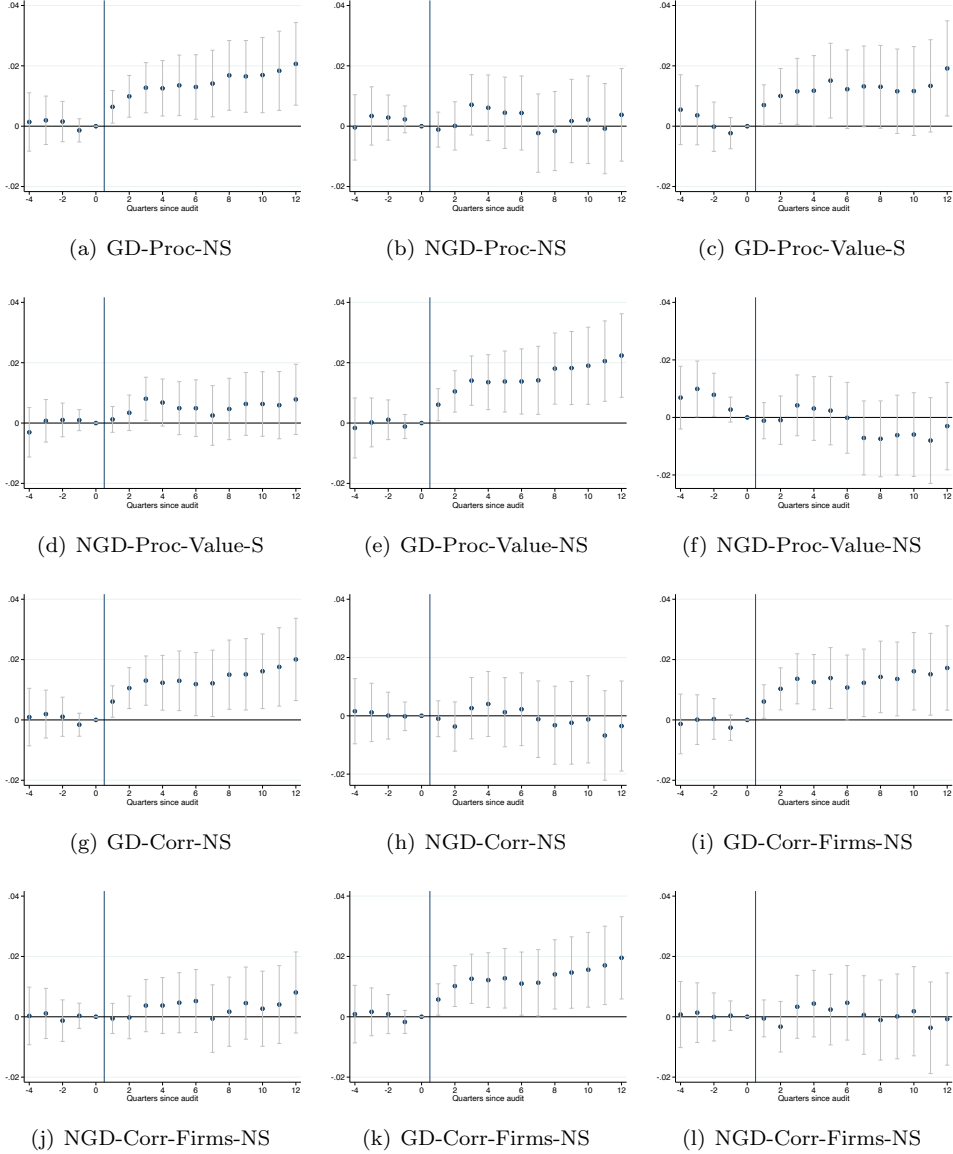
FIGURE A2

Government dependence sectors (establishments): alternative measures



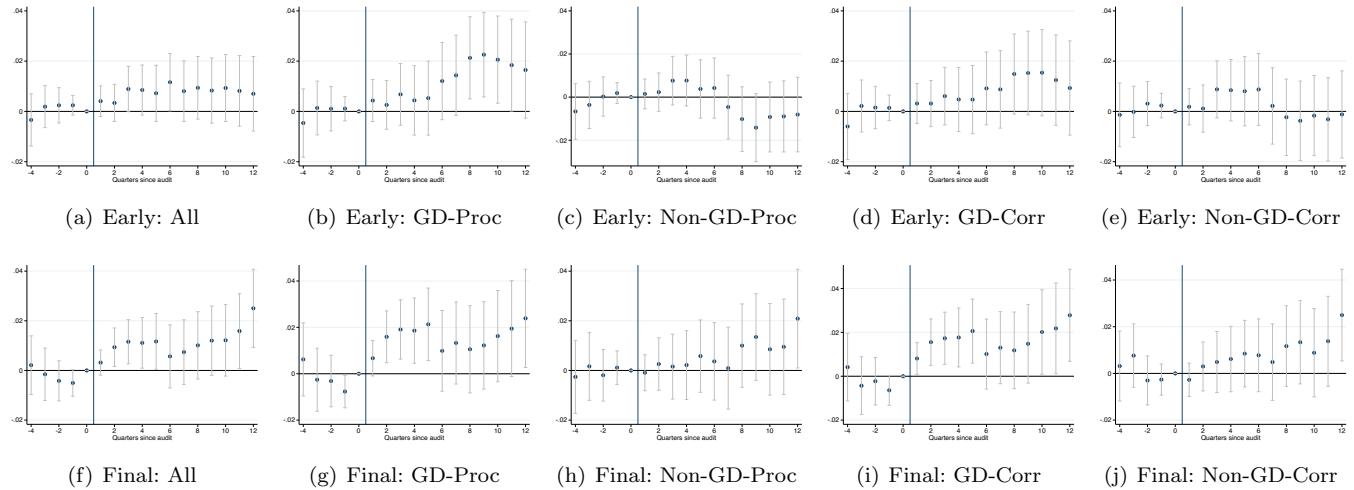
Notes: This figure reports the dynamic coefficients obtained from the estimation of equation 4.1 together with 95% confidence intervals, for different measures of government-dependent sectors (and their complement). The specification is $y_{mt} = \alpha_m + \alpha_t + \sum_{k=-4}^{k=-1} \mu_k + \sum_{k=1}^{k=12} \mu_k + \epsilon_{mt}$, and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window $[-4, +12]$ quarters around the audit quarter. The dependent variable is the logarithm of private sector establishments. *GD* and *NGD* stand for government-dependent and non-government-dependent, respectively, and all alternative measures based on them are described in section 5.2. The other abbreviations in the figure are *S* and *NS*, which stand for “scaled” and “not scaled,” respectively. “Value” (“Firms”) indicates that the sectoral classification comes from the distribution based on total value of contracts (total number of firms) in an industry.

FIGURE A3
Government-dependent sectors (firms): alternative measures



Notes: This figure reports the dynamic coefficients obtained from the estimation of equation 4.1 together with 95% confidence intervals, for different measures of government-dependent sectors (and their complement). The specification is $y_{mt} = \alpha_m + \alpha_t + \sum_{k=-4}^{k=-1} \mu_k + \sum_{k=1}^{k=12} \mu_k + \epsilon_{mt}$, and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window $[-4, +12]$ quarters around the audit quarter. The dependent variable is the logarithm of private sector firms. *GD* and *NGD* stand for government-dependent and non-government-dependent, respectively, and all alternative measures based on them are described in section 5.2. The other abbreviations in the figure are *S* and *NS*, which stand for “scaled” and “not scaled,” respectively. “Value” (“Firms”) indicates that the sectoral classification comes from the distribution based on total value of contracts (total number of firms) in an industry.

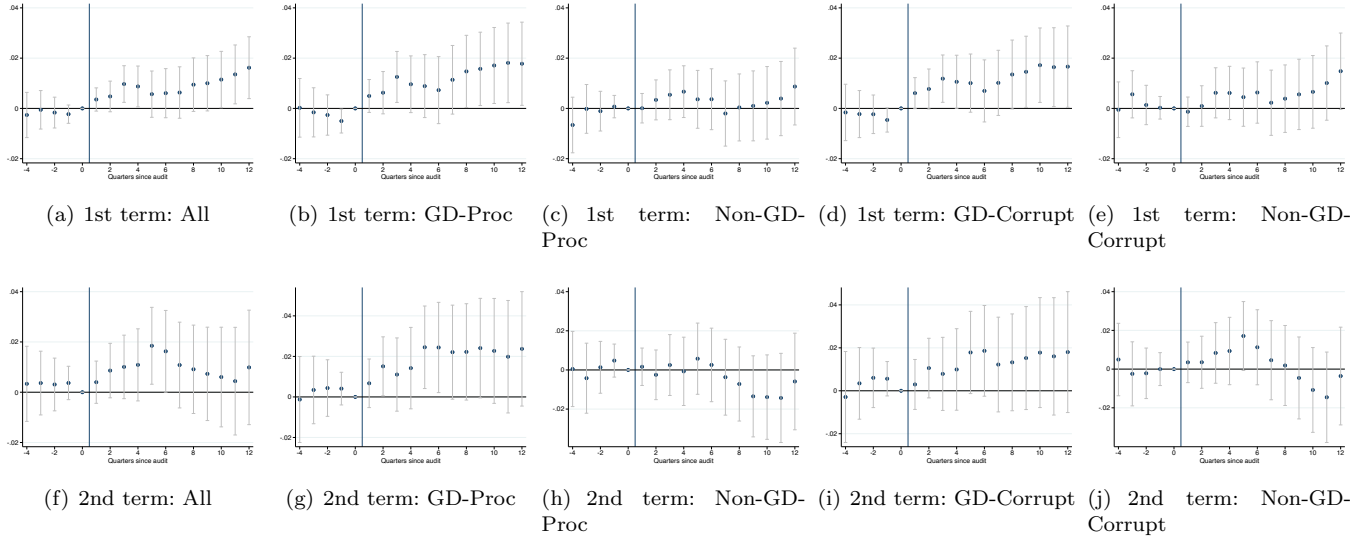
FIGURE A4
Direct effects and political incentives: early vs late



Notes: This figure reports the dynamic coefficients obtained from the estimation of equation 4.1 together with 95% confidence intervals. The specification is $y_{mt} = \alpha_m + \alpha_t + \sum_{k=-4}^{k=-1} \mu_k + \sum_{k=1}^{k=12} \mu_k + \varepsilon_{mt}$, and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window $[-4, +12]$ around the audit quarter. The dependent variables is the log of the number of firms, and in each government-dependent sector, or its complement, as defined in section 5.2. Panels A to E show the results for municipalities that were audited in the first two years of the mayor's term, while Panels F to J present them for those audited in the last two years.

FIGURE A5

Direct effects and political incentives: first vs second term



Notes: This figure reports the dynamic coefficients obtained from the estimation of equation 4.1 together with 95% confidence intervals. The specification is $y_{mt} = \alpha_m + \alpha_t + \sum_{k=-4}^{-1} \mu_k + \sum_{k=1}^{12} \mu_k + \epsilon_{mt}$, and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window $[-4, +12]$ around the audit quarter. The dependent variables are the log of the number of firms, and in each government-dependent sector, or its complement, as defined in section 5.2. Panels A to E present the results for municipalities that were audited during the mayor's first term, while Panels F to J present them for those audited during the mayor's second term.

TABLE A1
Correlation across government dependence measures

	GD-Procurement				GD-Corrupt			
	Contracts scaled	Contracts unscaled	Value scaled	Value unscaled	Contracts scaled	Contracts unscaled	Firms scaled	Firms unscaled
GD-Proc-Contracts scaled	1							
GD-Proc-Contracts unscaled	0.588	1						
GD-Proc-Value scaled	0.556	0.338	1					
GD-Proc-Value unscaled	0.453	0.633	0.582	1				
GD-Corr-Contracts scaled	0.267	0.274	0.225	0.274	1			
GD-Corr-Contracts unscaled	0.238	0.528	0.122	0.464	0.548	1		
GD-Corr-Firms scaled	0.246	0.260	0.246	0.274	0.850	0.505	1	
GD-Corr-Firms unscaled	0.227	0.512	0.136	0.466	0.510	0.931	0.524	1

Notes: This table reports the correlation matrix for all measures of government dependence we create, as discussed in section 5.2.

TABLE A2
Most and least common government-dependent sectors: procurement

Ranked list of TOP 50 GD sectors	Ranked list of LEAST 50 GD sectors
Wholesale of instruments and materials for medical, surgical, orthopedic and dental	Soy cultivation
Wholesale of office and stationery goods, books, newspapers and other publications	Cattle breeding
Wholesale of machinery, apparatus and equipment for dental and medical purposes	Coffee cultivation
Manufacture of pharmaceutical preparations	Orange cultivation
Wholesale of pharmaceutical products for human and veterinary use	Cultivation of permanent fruit crops (except orange and grape)
Manufacture of medicines	Activities of religious organizations
Retail of medical and orthopedic supplies	Raising of large animals
Manufacture of organic chemicals	Assistance activities for elderly and disabled
Wholesale of computers and computer supplies	Pig breeding
Industrial gas manufacturing	Activities of unions
Wholesale of electrical material	Savings banks
Computer equipment manufacturing	Commercial banks
Manufacture of chemicals	Cultivation of temporary tillage plants
Manufacture of electromedical, electrotherapeutic and irradiation apparatus	Sugarcane cultivation
Pharmaceutical manufacturing	Poultry farming
Manufacture of instruments and materials for medical, dental or optical purposes	Early childhood education - preschool
Wholesale of liquefied petroleum gas (LPG)	Hairdressers and other beauty treatment activities
Retail of books, newspapers, magazines and stationery	Courier activities
Manufacture of cars, vans and utilities	Saltwater fishing
Manufacture of computer peripheral equipment	Livestock support activities
Manufacture of clocks and stopwatches	Credit, financing and investment companies
Retail of electrical material	Notaries
Wholesale (specialized) of other intermediate products	Early childhood education and day care
Wholesale of hardware and tools	Social assistance activities in private residences
Manufacture of optical, photographic and cinematographic instruments	Social, sports and similar clubs
Wholesale of chemicals and petrochemicals	Art and culture education
Wholesale of general merchandise, excluding agriculture	Housekeeper services
Wholesale of food products	Compulsory social security
Wholesale of construction materials	Manufacture of sneakers
Retail of computer equipment and supplies	Banks with commercial portfolio
Wholesale of general merchandise (mainly food)	Saltwater and brackish aquaculture
Wholesale trade of machinery and equipment for industrial use	Justice
Wholesale of cement	Manufacture of tobacco products
Wholesale of general machinery, apparatus and equipment	Manufacture of raw sugar
Wired telecommunications	Vehicle parking
Retail of lubricants	Activities of organizations for culture and art
Wholesale of equipment for personal and household use	Manufacture of wine
Manufacture of heavy military equipment and firearms	Real estate activities
Wholesale of machinery and equipment for commercial use	Extraction of iron ore
Manufacture of paper, cardboard, paperboard	Rental of videotapes and DVDs
Retail of hardware, wood and construction materials	Manufacture of iron
Manufacture of pipes and plastic material for construction	Veterinary activities
Maintenance and repair of electronic and optical equipment	Rental of clothing, jewelry and accessories
Manufacture of measuring, testing and control equipment	Freshwater aquaculture
Retail of paints and materials	Other financial services activities
Manufacture of insulated wires, cables and electrical conductors	Radio activities
Manufacture of environmental machinery and equipment	Activities of employer associations
Manufacture of glass packaging	Insurance
Retail of musical instruments and accessories	Health care for mental disorders
Manufacture of oil refining products	Highways, bridges, tunnels and related structures

Notes: This table reports the most and least common 4-digit sectors we classify as government-dependent measured by GD-Procurement, as discussed in section 5. We select the top/least 50 sectors.

TABLE A3
Most and least common government-dependent sectors: corruption

Ranked list of TOP 50 GD sectors	Ranked list of LEAST 50 GD sectors
Wholesale of pharmaceutical products	Horticulture
Maintenance and repair of railway vehicles	Manufacture of cement
Construction of road and railroad	Forest production
Railway passenger transport	Manufacture of footwear of synthetic material
Manufacture of cars and trucks	Wholesale of pesticides and fertilizers
Wholesale of materials for medical, surgical, orthopedic and dental use	Manufacture of machinery and equipment for the plastics industry
Treatment and disposal of non-hazardous waste	Extraction of radioactive minerals
Passenger air transport	Compulsory social security
Road passenger transport	Housekeeper services
Wholesale of general merchandise (mainly food)	Saltwater fishing
Retail of automotive fuel	Extraction of iron ore
Patient removal services (except mobile emergency care)	Cultivation of flowers and ornamental plants
Retail of general merchandise (mainly supermarkets)	Manufacture of iron
Civil engineering works	Rental of clothing, jewelry and accessories
Construction of buildings	Manufacture of metal packaging
Manufacture of juices from fruits and vegetables	Orange growing
Earthworks	Manufacture of cosmetics, perfumery and toiletries
Wholesale of processed flour and starch	Coffee cultivation
Construction of foundations	Social, sports and similar clubs
Urbanization works: streets, squares and sidewalks	Cultivation of permanent fruit crops
Road passenger transport	Library and archive activities
Electricity and telecommunications works	Insurance
Retail of books, newspapers, magazines and stationery	Manufacture of artificial and synthetic fibers
Construction of water supply, sewage systems and related	Freshwater aquaculture
Wholesale of office and stationery supplies	Manufacture of sneakers (any material)
Manufacture of medicines	Raising of large animals
Wholesale of machinery and equipment for dental and medical purposes	Pig breeding
Manufacture of steam generating boilers	Interior design and decoration
Manufacture of milk	Hairdressers and other beauty treatment activities
Manufacture of construction machinery (except tractors)	Savings banks
Retail of medical and orthopedic supplies	Sugarcane cultivation
Manufacture of electromedical, electrotherapeutic and irradiation apparatus	Manufacture of paper
Road passenger transport by freight	Saltwater and brackish aquaculture
Integrated edition of cadastre and other graphic products	Credit, financing and investment companies
Rental of office machinery and equipment	Manufacture of refined sugar
School transportation	Veterinary activities
Demolition and preparation of construction sites	Manufacture of wine
Wholesale of food products	Call center activities
Manufacture of meat products	Commercial Banks
Milling of wheat	Grape growing
Construction of special artworks	Other financial services activities
Printing of materials for other uses	Livestock support activities
Credit card management	Banks with commercial portfolio
Services of land preparation	Soy cultivation
Manufacture of clocks and stopwatches	Poultry farming
Retail of general merchandise (mainly food)	Early childhood education
Wholesale of food products	Activities of religious organizations
Car rental	Activities of employer associations
Hospital care activities	Highways, bridges, tunnels and related structures
Manufacture of metal furniture	Iron and steel foundry

Notes: This table reports the most and least common 4-digit sectors we classify as government-dependent measured by GD-Corrupt, as discussed in section 5. We select the top/least 50 sectors.

TABLE A4
Sao Paulo municipal public procurement

	(1)	(2)	(3)
	Establishments	Establishments first time in municipality	Establishments first time ever
PostAudit	0.014 (0.012)	0.055** (0.028)	0.086** (0.037)
Observations	4,846	4,846	4,846
R-squared	0.942	0.983	0.959
Municipality FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Avg dep var	6.302	3.772	2.949
SD dep var	0.359	2.468	1.970

Notes: This table illustrates the main effects of the audits on local public procurement outcomes in the state of Sao Paulo. The table reports the coefficients obtained from the estimation of equation 4.2. The specification is $y_{mt} = \alpha_m + \alpha_t + \beta \times PostAudit_{mt} + \epsilon_{mt}$, and is discussed in Section 4. The regression uses data from Sao Paulo public procurement from 2008. The sample includes all SP municipalities audited in the period 2007-2014 and all eligible non-audited SP municipalities, and covers the window [-1,+3] years around the audit year. $PostAudit_{mt}$ is an indicator variable taking value 1 for all years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year fixed effects. *Establishments* is the log of the total number of private sector establishments who obtain at least one contract from the municipality. *Establishments First Time in Municipality* is the log of the total number of private sector establishments that obtain at least one contract from the municipality, and that never obtained any contract from *that* municipality prior to the audit. *Establishments First Time Ever* is the log of the total number of private sector establishments that obtain at least one contract from the municipality, and that never obtained any contract from *any* municipality prior to the audit. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the year before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A5
Main effect: PAC/PAS sample

	(1)	(2)
	Establishments	Firms
PostAudit	0.018** (0.008)	0.018** (0.008)
Observations	199,480	199,480
R-squared	0.947	0.946
Municipality FE	Yes	Yes
Year-quarter FE	Yes	Yes
Avg dep var	1.377	1.356
SD dep var	1.397	1.376

Notes: This table illustrates the main effects of the audits on firms restricting the analysis to the samples that overlap with the PAC and PAS databases. The table reports the coefficients obtained from the estimation of equation 4.2. The specification is $y_{mt} = \alpha_m + \alpha_t + \beta \times PostAudit_{mt} + \epsilon_{mt}$, and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window [-4,+12] quarters around the audit quarter. $PostAudit_{mt}$ is an indicator variable taking value 1 for all quarter-years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year-quarter fixed effects. *Establishments* is the log of the total number of private sector establishments in the municipality. *Firms* is the log of the total number of private sector firms in the municipality. Results are based on the RAIS dataset but focusing on the sectors and firms covered by the PAC and PAS surveys and for establishments and firms with more than 20 employees. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the 4 quarters before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A6
The impact of audits on firms: robustness

	(1) No window restriction		(3) Drop audited twice		(5) Audited post-2004		(7) Audited pre-2012	
	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms
Panel A								
PostAudit	0.034*** (0.008)	0.034*** (0.008)	0.009** (0.004)	0.010** (0.004)	0.011** (0.005)	0.012** (0.005)	0.010** (0.004)	0.011*** (0.004)
Observations	372,513	372,513	273,293	273,293	266,054	266,054	275,369	275,369
R-squared	0.983	0.984	0.984	0.985	0.984	0.984	0.984	0.985
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg dep var	4.127	4.086	4.180	4.139	4.181	4.141	4.178	4.137
SD dep var	1.624	1.619	1.611	1.606	1.611	1.606	1.612	1.607
Panel B								
	Ever audited		Control for audit probability		No winsorization		5% winsorization	
	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms
PostAudit	0.024*** (0.003)	0.026*** (0.003)	0.009** (0.004)	0.009** (0.004)	0.008** (0.004)	0.009** (0.004)	0.006* (0.004)	0.007* (0.004)
Observations	31,725	31,725	277,392	277,392	277,392	277,392	277,392	277,392
R-squared	0.994	0.994	0.984	0.985	0.985	0.985	0.983	0.984
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg dep var	3.991	3.944	4.179	4.138	4.180	4.140	4.159	4.119
SD dep var	1.642	1.635	1.611	1.607	1.616	1.611	1.517	1.512

Notes: This table illustrates the robustness of the main effects of the audit on the local economy. The table reports the coefficients obtained from the estimation of equation 4.2. The baseline specification is $y_{mt} = \alpha_m + \alpha_t + \beta \times PostAudit_{mt} + \epsilon_{mt}$, and is discussed in Section 4. Unless otherwise specified and discussed in Section 5.2, the sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window [-4,+12] quarters around the audit quarter. $PostAudit_{mt}$ is an indicator variable taking value 1 for all quarter-years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. $Establishments$ ($Firms$) is the log of the total number of private sector establishments (firms) in the municipality. The various robustness tests are discussed in section 5.2. Notice that in the specification where we drop the never-audited municipalities (i.e., columns 1 and 2 of Panel B, we include year rather than year-quarter fixed effects; all other specifications include municipality and year-quarter fixed effects. $Avg\ dep\ var$ and $SD\ dep\ var$ are computed using data in the 4 quarters before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A7
The impact of audits on firms: robustness to alternative measures of government-dependent sectors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	GD-Procurement						GD-Corrupt					
	Contracts unscaled		Value scaled		Value unscaled		Contracts unscaled		Firms scaled		Firms unscaled	
Panel A: Establishments	GD	Non-GD	GD	Non-GD	GD	Non-GD	GD	Non-GD	GD	Non-GD	GD	Non-GD
PostAudit	0.012** (0.005)	-0.001 (0.006)	0.010* (0.006)	0.004 (0.004)	0.014*** (0.005)	-0.010* (0.005)	0.012** (0.005)	-0.002 (0.006)	0.013*** (0.005)	0.001 (0.005)	0.011** (0.005)	-0.000 (0.006)
Observations	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392
R-squared	0.981	0.960	0.975	0.983	0.981	0.961	0.981	0.956	0.975	0.981	0.981	0.958
Avg dep var	3.960	2.501	3.118	3.786	3.945	2.565	3.995	2.362	3.514	3.470	3.988	2.407
SD dep var	1.692	1.301	1.647	1.551	1.691	1.332	1.678	1.295	1.514	1.687	1.675	1.320
p-value GD vs non-GD	0.062	0.062	0.344	0.344	0.001	0.001	0.072	0.072	0.067	0.067	0.116	0.116
Panel B: Firms	GD	Non-GD	GD	Non-GD	GD	Non-GD	GD	Non-GD	GD	Non-GD	GD	Non-GD
PostAudit	0.012*** (0.005)	-0.000 (0.005)	0.010* (0.005)	0.005 (0.004)	0.014*** (0.005)	-0.009* (0.005)	0.012** (0.005)	-0.002 (0.005)	0.013*** (0.005)	0.003 (0.005)	0.011** (0.005)	0.000 (0.005)
Observations	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392
R-squared	0.981	0.963	0.975	0.983	0.981	0.964	0.981	0.959	0.975	0.982	0.981	0.961
Avg dep var	3.943	2.405	3.107	3.738	3.929	2.469	3.977	2.259	3.500	3.412	3.970	2.308
SD dep var	1.683	1.267	1.640	1.544	1.682	1.306	1.669	1.258	1.505	1.684	1.667	1.287
p-value GD vs non-GD	0.071	0.071	0.438	0.438	0.001	0.001	0.062	0.062	0.108	0.108	0.108	0.108
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table illustrates the robustness of the main effects of the audit on the local economy, using various alternative definitions of government-dependent sectors. The table reports the coefficients obtained from the estimation of equation 4.2. The specification is $y_{mt} = \alpha_m + \alpha_t + \beta \times PostAudit_{mt} + \epsilon_{mt}$, and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window [-4,+12] quarters around the audit quarter. $PostAudit_{mt}$ is an indicator variable taking value 1 for all quarter-years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year-quarter fixed effects. *Establishments (Firms)* is the log of the total number of private sector establishments (firms) in the municipality. The various definitions of government dependence are discussed in section 5.2. The *p-value GD vs Non-GD* presents the p-value for the difference between *PostAudit* coefficients in GD vs Non-GD sectors. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the 4 quarters before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A8
Direct effects: discipline and selection

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	GD Procurement	Non-GD Procurement	GD Corrupt	Non-GD Corrupt	All	GD Procurement	Non-GD Procurement	GD Corrupt	Non-GD Corrupt
	Panel A: new mayor [0,3]					Panel B: no change in mayor [0,3]				
PostAudit	0.006 (0.004)	0.011** (0.006)	-0.000 (0.006)	0.013** (0.006)	-0.003 (0.006)	0.016** (0.007)	0.019** (0.009)	0.009 (0.008)	0.012 (0.008)	0.017** (0.008)
Observations	267,311	267,311	267,311	267,311	267,311	255,748	255,748	255,748	255,748	255,748
R-squared	0.984	0.976	0.979	0.974	0.981	0.984	0.976	0.979	0.974	0.980
Avg dep var	4.139	3.594	3.310	3.539	3.369	4.144	3.598	3.314	3.543	3.374
SD dep var	1.606	1.597	1.594	1.526	1.670	1.606	1.597	1.596	1.526	1.672
p-value Panel A vs B	0.185	0.491	0.337	0.929	0.050	0.185	0.491	0.337	0.929	0.050
	Panel C: new party [0,3]					Panel D: no change in party [0,3]				
PostAudit	0.006 (0.004)	0.010* (0.006)	0.003 (0.005)	0.009* (0.006)	0.004 (0.005)	0.016** (0.007)	0.024** (0.009)	0.002 (0.009)	0.020** (0.009)	0.002 (0.009)
Observations	267,949	267,949	267,949	267,949	267,949	255,110	255,110	255,110	255,110	255,110
R-squared	0.985	0.976	0.980	0.974	0.981	0.984	0.976	0.979	0.974	0.980
Avg dep var	4.140	3.595	3.311	3.540	3.370	4.143	3.598	3.314	3.542	3.373
SD dep var	1.605	1.597	1.594	1.526	1.670	1.606	1.597	1.596	1.526	1.672
p-value Panel C vs D	0.207	0.184	0.897	0.262	0.846	0.207	0.184	0.897	0.262	0.846
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table illustrates the main effects of the audits on firms for different subsamples, depending on when the audit was conducted. Panel A presents the results for municipalities that faced a change in mayor in the three years after the audit, while Panel B presents results for municipalities that did not face any change in mayor in the same period. Panel C presents the results for municipalities that faced a change in the ruling party in the three years after the audit, while Panel D presents results for municipalities that did not face any change in the ruling party in the same period. The table reports the coefficients obtained from the estimation of equation 4.2. The specification is $y_{mt} = \alpha_m + \alpha_t + \beta \times PostAudit_{mt} + \epsilon_{mt}$, and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window [-4,+12] quarters around the audit quarter. $PostAudit_{mt}$ is an indicator variable taking value 1 for all quarter-years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year-quarter fixed effects. The dependent variable is the log of the total number of private sector firms in the municipality. Dependent variables in columns 1 and 6 refer to all sectors in the municipality, columns 2 and 6 to *GD-Procurement* sectors, columns 3 and 7 to *Non-GD-Procurement* sectors, columns 4 and 9 to *GD-Corrupt* sectors, and columns 5 and 10 to *Non-GD-Corrupt* sectors. These classifications are defined in Section 5.2. The *p-value Panel A vs B (C vs D)* presents the p-value for the difference between *PostAudit* coefficients in the same column across panels. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the 4 quarters before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A9
Heterogeneity by corruption detected: main

	(1)	(2)	(3)	(4)	(5)
	All	GD Procurement	Non-GD Procurement	GD Corrupt	Non-GD Corrupt
Panel A: High corruption					
PostAudit \times Z	0.052*** (0.007)	0.071*** (0.008)	0.007 (0.008)	0.076*** (0.008)	0.003 (0.009)
PostAudit	-0.023*** (0.004)	-0.030*** (0.005)	-0.001 (0.005)	-0.034*** (0.004)	0.002 (0.006)
Observations	277,392	277,392	277,392	277,392	277,392
R-squared	0.985	0.977	0.980	0.975	0.981
Avg dep var	4.138	3.593	3.309	3.538	3.367
SD dep var	1.607	1.598	1.595	1.527	1.671
Panel B: Predicted high corruption					
PostAudit \times Z	0.041*** (0.004)	0.059*** (0.005)	0.001 (0.005)	0.062*** (0.005)	-0.003 (0.005)
PostAudit	0.008** (0.004)	0.012** (0.005)	0.003 (0.005)	0.011** (0.004)	0.004 (0.005)
Observations	277,392	277,392	277,392	277,392	277,392
R-squared	0.985	0.977	0.980	0.975	0.981
Municipality FE	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes
Avg dep var	4.138	3.593	3.309	3.538	3.367
SD dep var	1.607	1.598	1.595	1.527	1.671

Notes: This table illustrates the heterogeneous effects of the audit on firms, with an heterogeneity aimed at capturing the importance of detecting high levels of corruption. The table reports the coefficients obtained from the estimation of equation 4.3. The specification is $y_{mt} = \alpha_m + \alpha_t + \beta_1 \times PostAudit_{mt} + \beta_2 \times Z_m \times PostAudit_{mt} + \epsilon_{mt}$ and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window $[-4, +12]$ quarters around the audit quarter. $PostAudit_{mt}$ is an indicator variable taking value 1 for all quarter-years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year-quarter fixed effects. Z_m are fixed municipality characteristics. In Panel A, Z_m is an indicator for municipalities where the audit uncovers above-median irregularities (scaled by municipality size), while in Panel B, Z_m is based on the predicted probability that a municipality has high levels of corruption detected (using LASSO). Notice that the latter probability is standardized by its mean and standard deviation (see Section 6 for more details). The dependent variable is the log of the total number of private sector firms in the municipality. Column 1 refers to all firms in the municipality, column 2 to *GD-Procurement* sectors, column 3 to *Non-GD-Procurement* sectors, column 4 to *GD-Corrupt* sectors, and column 5 to *Non-GD-Corrupt* sectors. These classifications are defined in section 5.2. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the year before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A10
Heterogeneity by corruption detected: excluding spillovers

	(1) All	(2) GD Procurement	(3) Non-GD Procurement	(4) GD Corrupt	(5) Non-GD Corrupt
Panel A: High corruption					
PostAudit × Z	0.053*** (0.007)	0.073*** (0.008)	0.007 (0.008)	0.077*** (0.008)	0.003 (0.009)
PostAudit	-0.010* (0.006)	-0.013* (0.007)	0.000 (0.007)	-0.021*** (0.007)	0.008 (0.007)
Observations	44,075	44,075	44,075	44,075	44,075
R-squared	0.992	0.988	0.989	0.987	0.990
Avg dep var	4.484	3.918	3.672	3.844	3.754
SD dep var	1.734	1.740	1.705	1.671	1.780
Panel B: Predicted high corruption					
PostAudit × Z	0.041*** (0.004)	0.058*** (0.005)	0.001 (0.005)	0.062*** (0.005)	-0.003 (0.005)
PostAudit	0.019*** (0.006)	0.027*** (0.007)	0.004 (0.006)	0.022*** (0.007)	0.010 (0.006)
Observations	44,075	44,075	44,075	44,075	44,075
R-squared	0.992	0.988	0.989	0.987	0.990
Municipality FE	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes
Avg dep var	4.484	3.918	3.672	3.844	3.754
SD dep var	1.734	1.740	1.705	1.671	1.780

Notes: This table illustrates the heterogeneous effects of the audit on on firms, with an heterogeneity aimed at capturing the importance of detecting high levels of corruption. The table reports the coefficients obtained from the estimation of equation 4.3. The specification is $y_{mt} = \alpha_m + \alpha_t + \beta_1 \times PostAudit_{mt} + \beta_2 \times Z_m \times PostAudit_{mt} + \epsilon_{mt}$ and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, excluding from the sample any never-audited municipality in a micro-region where there was at least one municipality audited, and covers the window [-4,+12] quarters around the audit quarter. $PostAudit_{mt}$ is an indicator variable taking value 1 for all quarter-years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year-quarter fixed effects. Z_m are fixed municipality characteristics. In Panel A, Z_m is an indicator for municipalities where the audit uncovers above-median irregularities (scaled by municipality size), while in Panel B, Z_m is based on the predicted probability that a municipality has high levels of corruption detected (using LASSO). Notice that the latter probability is standardized by its mean and standard deviation (see Section 6 for more details). The dependent variable is the log of the total number of private sector firms in the municipality. Column 1 refers to all firms in the municipality, column 2 to *GD-Procurement* sectors, column 3 to *Non-GD-Procurement* sectors, column 4 to *GD-Corrupt* sectors, and column 5 to *Non-GD-Corrupt* sectors. These classifications are defined in section 5.2. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the year before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A11
Heterogeneity by corruption detected: spillovers

	(1) All	(2) GD Procurement	(3) Non-GD Procurement	(4) GD Corrupt	(5) Non-GD Corrupt
Panel A: share of audited municipalities					
PostAudit × Z	0.018*** (0.005)	0.020*** (0.006)	0.011** (0.005)	0.013** (0.006)	0.018*** (0.006)
PostAudit	0.020*** (0.006)	0.029*** (0.007)	0.001 (0.006)	0.018** (0.007)	0.015** (0.007)
Observations	69,866	69,866	69,866	69,866	69,866
R-squared	0.993	0.989	0.989	0.988	0.990
Avg dep var	4.025	3.475	3.213	3.440	3.251
SD dep var	1.677	1.691	1.626	1.621	1.706
Panel B: share of high corruption cases					
PostAudit × Z	0.016*** (0.004)	0.024*** (0.007)	-0.001 (0.004)	0.026*** (0.006)	-0.005 (0.005)
PostAudit	0.014*** (0.005)	0.023*** (0.006)	-0.004 (0.005)	0.015** (0.006)	0.007 (0.006)
Observations	69,866	69,866	69,866	69,866	69,866
R-squared	0.993	0.989	0.989	0.988	0.990
Municipality FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Avg dep var	4.025	3.475	3.213	3.440	3.251
SD dep var	1.677	1.691	1.626	1.621	1.706

Notes: This table illustrates the heterogeneous effects for the geographic spillover effects of the audits, which aim to capture the importance of detecting high levels of corruption. The table reports the coefficients obtained from the estimation of a specification similar to $y_{mt} = \alpha_m + \alpha_t + \beta_1 \times PostAudit_{mt} + \beta_2 \times Z_m \times PostAudit_{mt} + \epsilon_{mt}$, but for the impact of the audits on nearby municipalities, as discussed in Section 5. That is, we define as nearby those municipalities in the same micro-region of an audited one, and exclude audited municipalities. The treatment dummy $PostAudit_{mt}$ is equal to one the first time a micro-region has one of its municipality that is audited. The sample covers the period 2003-2014 and the window [-4,+12] quarters around the audit quarter. All specifications include municipality and year-quarter fixed effects. Z_m are fixed municipality characteristics. In Panel A, Z_m is the standardized share of audited municipalities over the total number of municipalities in the micro-region. In Panel B, Z_m is the total number of irregularity cases uncovered by the audits over the total number of establishments in the micro-region, standardized by its mean and standard deviation. The dependent variable is the log of the total number of private sector firms in the municipality. Column 1 refers to all firms in the municipality, column 2 to *GD-Procurement* sectors, column 3 to *Non-GD-Procurement* sectors, column 4 to *GD-Corrupt* sectors, and column 5 to *Non-GD-Corrupt* sectors. These classifications are defined in section 5.2. The *p-value GD vs Non-GD* presents the p-value for the difference between *PostAudit* coefficients in GD vs Non-GD sectors. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the 4 quarters before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A12
Robustness to excluding litigation-related sectors

	(1)	(2)	(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)	
			GD-Procurement		Non-GD-Procurement		GD-Corrupt		Non-GD-Corrupt									
	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms
Panel A: excluding legal activities (CNAE 69117)																		
PostAudit	0.008** (0.004)	0.008** (0.004)	0.014*** (0.005)	0.014*** (0.005)	0.001 (0.005)	0.002 (0.005)	0.012*** (0.005)	0.013*** (0.005)	0.002 (0.005)	0.002 (0.005)								
Observations	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392
R-squared	0.984	0.985	0.977	0.977	0.979	0.980	0.975	0.975	0.980	0.975	0.980	0.975	0.980	0.981	0.980	0.981	0.981	0.981
Avg dep var	4.178	4.148	3.607	3.593	3.368	3.329	3.552	3.538	3.426	3.388	3.426	3.388	3.426	3.388	3.426	3.388	3.426	3.388
SD dep var	1.611	1.602	1.606	1.599	1.601	1.587	1.535	1.527	1.674	1.663	1.674	1.663	1.674	1.663	1.674	1.663	1.674	1.663
Panel B: excluding legal, accounting, and auditing activities (CNAE 69)																		
PostAudit	0.008** (0.004)	0.008** (0.004)	0.014*** (0.005)	0.014*** (0.005)	0.000 (0.005)	0.001 (0.005)	0.012*** (0.005)	0.013*** (0.005)	0.001 (0.005)	0.002 (0.005)								
Observations	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392
R-squared	0.984	0.985	0.977	0.977	0.979	0.980	0.975	0.975	0.980	0.975	0.980	0.975	0.980	0.981	0.980	0.981	0.981	0.981
Avg dep var	4.172	4.142	3.607	3.593	3.354	3.315	3.552	3.538	3.413	3.375	3.413	3.375	3.413	3.375	3.413	3.375	3.413	3.375
SD dep var	1.608	1.599	1.606	1.599	1.595	1.581	1.535	1.527	1.669	1.658	1.669	1.658	1.669	1.658	1.669	1.658	1.669	1.658
Panel C: excluding legal, accounting, auditing, and consulting activities (CNAE 69 and 70)																		
PostAudit	0.008** (0.004)	0.008** (0.004)	0.014*** (0.005)	0.014*** (0.005)	0.000 (0.005)	0.001 (0.005)	0.012*** (0.005)	0.013*** (0.005)	0.001 (0.005)	0.002 (0.005)								
Observations	277,391	277,391	277,391	277,391	277,391	277,391	277,391	277,391	277,391	277,391	277,391	277,391	277,391	277,391	277,391	277,391	277,391	277,391
R-squared	0.984	0.985	0.977	0.977	0.979	0.980	0.975	0.975	0.980	0.975	0.980	0.975	0.980	0.981	0.980	0.981	0.981	0.981
Avg dep var	4.171	4.142	3.607	3.593	3.353	3.314	3.552	3.538	3.412	3.374	3.412	3.374	3.412	3.374	3.412	3.374	3.412	3.374
SD dep var	1.608	1.599	1.606	1.599	1.594	1.581	1.535	1.527	1.669	1.658	1.669	1.658	1.669	1.658	1.669	1.658	1.669	1.658
Panel D: exclude full service sector																		
PostAudit	0.008** (0.004)	0.008** (0.004)	0.013*** (0.005)	0.013*** (0.005)	0.001 (0.005)	0.002 (0.005)	0.013*** (0.005)	0.013*** (0.005)	0.002 (0.005)	0.003 (0.005)								
Observations	277,273	277,273	277,273	277,273	277,273	277,273	277,273	277,273	277,273	277,273	277,273	277,273	277,273	277,273	277,273	277,273	277,273	277,273
R-squared	0.983	0.983	0.977	0.977	0.972	0.974	0.975	0.974	0.975	0.976	0.975	0.976	0.975	0.976	0.975	0.976	0.975	0.976
Avg dep var	4.032	4.001	3.568	3.554	3.053	3.007	3.528	3.515	3.118	3.073	3.528	3.515	3.118	3.073	3.528	3.515	3.118	3.073
SD dep var	1.553	1.544	1.593	1.585	1.476	1.459	1.522	1.514	1.584	1.571	1.522	1.514	1.584	1.571	1.522	1.514	1.584	1.571
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table illustrates the main effects of firms, excluding litigation-related sectors. The table reports the coefficients obtained from the estimation of equation 4.2. The specification is $y_{mt} = \alpha_m + \alpha_t + \beta \times PostAudit_{mt} + \epsilon_{mt}$, and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window [-4,+12] quarters around the audit quarter. $PostAudit_{mt}$ is an indicator variable taking value 1 for all quarter-years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year-quarter fixed effects. *Establishments* is the log of the total number of private sector establishments in the municipality in the specific sector highlighted in each panel. *Firms* is the log of the total number of private sector firms in the municipality in the specific sector highlighted in each panel. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the 4 quarters before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A13
Long-run effects on firms

	(1)	(2)	(3)	(4)	(5)	(6)
	3-year window (baseline)		6-year window		10-year window	
	Establishments	Firms	Establishments	Firms	Establishments	Firms
PostAudit	0.009** (0.004)	0.009** (0.004)	0.015*** (0.005)	0.015*** (0.005)	0.018*** (0.006)	0.018*** (0.006)
Observations	277,392	277,392	299,199	299,199	323,179	323,179
R-squared	0.984	0.985	0.985	0.985	0.985	0.985
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Avg dep var	4.179	4.138	4.179	4.138	4.179	4.138
SD dep var	1.611	1.607	1.611	1.607	1.611	1.607

Notes: This table illustrates the main effects of the audits on firms. The table reports the coefficients obtained from the estimation of equation 4.2. The specification is $y_{mt} = \alpha_m + \alpha_t + \beta \times PostAudit_{mt} + \epsilon_{mt}$, and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities. Columns 1 and 2 cover the window $[-4, +12]$ quarters around the audit quarter, columns 3 and 4 cover the window $[-4, 24]$, and columns 5 and 6 cover the window $[-4, 40]$. $PostAudit_{mt}$ is an indicator variable taking value 1 for all quarter-years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year-quarter fixed effects. *Establishments* is the log of the total number of private sector establishments in the municipality. *Firms* is the log of the total number of private sector firms in the municipality. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the 4 quarters before the audit. Robust standard errors are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE A14
Heterogeneous effects depending on extent of informality

	(1)	(2)	(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)	
			GD-Procurement		Non-GD-Procurement		GD-Corrupt		Non-GD-Corrupt									
	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms
PostAudit × Z	0.034*** (0.006)	0.033*** (0.006)	0.043*** (0.008)	0.043*** (0.008)	0.010* (0.005)	0.008 (0.005)	0.042*** (0.008)	0.042*** (0.008)	0.009* (0.005)	0.008 (0.005)								
PostAudit	0.009** (0.004)	0.009** (0.004)	0.014*** (0.005)	0.014*** (0.005)	0.001 (0.005)	0.003 (0.005)	0.013*** (0.005)	0.013*** (0.005)	0.002 (0.005)	0.004 (0.005)								
Observations	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392	277,392
R-squared	0.984	0.985	0.977	0.977	0.979	0.980	0.975	0.975	0.980	0.981	0.975	0.975	0.980	0.981	0.975	0.975	0.980	0.981
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg dep var	4.179	4.138	3.607	3.593	3.370	3.309	3.552	3.538	3.428	3.367								
SD dep var	1.611	1.607	1.606	1.598	1.602	1.595	1.535	1.527	1.675	1.671								

Notes: This table illustrates the heterogeneous effects of the audits depending on the pre-existing shares of informal employment in the municipality. The table reports the coefficients obtained from the following specification $y_{mt} = \alpha_m + \alpha_t + \gamma \times Z_m \times PostAudit_{mt} + \beta \times PostAudit_{mt} + \epsilon_{mt}$. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window [-4,+12] quarters around the audit quarter. $PostAudit_{mt}$ is an indicator variable taking value 1 for all quarter-years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year-quarter fixed effects. Z_m is the share of informal over formal workers in the 2000 Census, standardized by the mean and standard deviation. $Establishments$ is the log of the total number of private sector establishments in the municipality. $Firms$ is the log of the total number of private sector firms in the municipality. Dependent variables in columns 1 and 2 refer to all sectors in the municipality, columns 3 and 4 to *GD-Procurement* sectors, columns 5 and 6 to *Non-GD-Procurement* sectors, columns 7 and 8 to *GD-Corrupt* sectors, and columns 9 and 10 to *Non-GD-Corrupt* sectors. These classifications are defined in Section 5.2. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the 4 quarters before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A15
Informality

	(1)	(2)	(3)	(4)
	Formal and informal employment			
	PNAD (Pop. share)		PNAD (Inf. share)	
	informal	formal	informal	formal
PostAudit	0.020*** (0.003)	0.009*** (0.002)	0.018*** (0.002)	0.008*** (0.001)
Observations	56,015	56,015	56,015	56,015
R-squared	0.989	0.993	0.997	0.999
Municipality FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Avg dep var	7.602	7.631	7.759	7.128
SD dep var	1.054	1.097	1.158	1.462

Notes: This table illustrates the main effects of the audit on other measures of local economic activity, specifically informal versus formal employment. The table mostly reports the coefficients obtained from the estimation of equation 4.2. The specification is $y_{mt} = \alpha_m + \alpha_t + \beta \times PostAudit_{mt} + \epsilon_{mt}$ and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window [-1,+3] years around the audit year. $PostAudit_{mt}$ is an indicator variable taking value 1 for all years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year fixed effects. The construction of dependent variables, which measure informal and formal employment, is discussed in Section 3. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the year before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A16
Employment, hiring, and firing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	3-year window (baseline)			6-year window			10-year window		
	Employment	Hiring	Firing	Employment	Hiring	Firing	Employment	Hiring	Firing
PostAudit	0.007 (0.007)	0.006 (0.011)	0.003 (0.010)	0.013* (0.008)	0.013 (0.012)	0.009 (0.011)	0.017** (0.008)	0.022* (0.012)	0.016 (0.012)
Observations	279,654	279,654	279,654	301,496	301,496	301,496	325,493	325,493	325,493
R-squared	0.961	0.895	0.914	0.961	0.896	0.914	0.961	0.896	0.914
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg dep var	6.999	4.329	3.639	6.999	4.329	3.639	6.999	4.329	3.639
SD dep var	1.452	1.957	1.960	1.452	1.957	1.960	1.452	1.957	1.960

Notes: This table illustrates the main effects of the audits on employment. The table reports the coefficients obtained from the estimation of equation 4.2. The specification is $y_{mt} = \alpha_m + \alpha_t + \beta \times PostAudit_{mt} + \epsilon_{mt}$, and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities. Columns 1 to 3 cover the window [-4,+12] quarters around the audit quarter, columns 4 to 6 cover the window [-4, 24], and columns 7 to 9 covers the window [-4, 40]. $PostAudit_{mt}$ is an indicator variable taking value 1 for all quarter-years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year-quarter fixed effects. $Employment$ is the log of the total number of employees in the municipality. $Hiring$ is the log of the total number of employees hired in the municipality. $Firing$ is the log of the total number of employees fired in the municipality. $Avg\ dep\ var$ and $SD\ dep\ var$ are computed using eligible non-audited municipalities and audited municipalities in the 4 quarters before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A17
Does the federal government channel more resources to audited municipalities?

	(1)	(2)	(3)	(4)	(5)	(6)
	Federal capital transfers	Transfers Federal revenue transfers	Municipal participation fund	Total value	Grants Share of funds disbursed	Total value of federal procurement
PostAudit	-0.135 (0.101)	0.002 (0.063)	0.021 (0.063)	-0.052 (0.097)	-0.001 (0.008)	0.045 (0.061)
Observations	71,332	71,332	71,332	71,332	71,332	71,332
R-squared	0.282	0.259	0.237	0.322	0.248	0.604
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Avg dep var	2.864	14.69	14.37	10.40	0.621	1.869
SD dep var	5.029	2.765	2.762	4.888	0.390	4.429

Notes: This table illustrates the main effects of the audit on resources channeled by the federal government to municipalities. The table reports the coefficients obtained from the estimation of equation 4.2. The specification is $y_{mt} = \alpha_m + \alpha_t + \beta \times PostAudit_{mt} + \epsilon_{mt}$, and is discussed in Section 4. The sample includes all municipalities audited in the period 2003-2014 and all eligible non-audited municipalities, and covers the window [-1,+3] years around the audit year. $PostAudit_{mt}$ is an indicator variable taking value 1 for all years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. All specifications include municipality and year fixed effects. *Federal Capital Transfers* are intergovernmental transfers of revenues from capital, *Federal Revenue Transfers* are intergovernmental transfers of current revenues, *Municipal Participation Fund* are federal government transfers from income and production taxes distributed according to the number of inhabitants, *Total Value* is the total value of block grants transferred from the federal to local governments, and *Share of Funds Disbursed* is the share of funds disbursed out of the grant's total amount. *Total Value of Federal Procurement* is the total value of federal procurement contracts granted to firms headquartered in the municipality. The data come from the CGU and the National Treasury's FIMBRA dataset, and all measures except column 5 are in logs. *Avg dep var* and *SD dep var* are computed using eligible non-audited municipalities and audited municipalities in the year before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A18
Firm-level sales and investment

	(1)	(2)	(3)	(4)
	GD-Procurement		GD-Corrupt	
	Sales per emp	Investment	Sales per emp	Investment
PostAudit \times Z	0.048*** (0.014)	0.020** (0.008)	0.039*** (0.015)	0.015** (0.007)
PostAudit	0.006 (0.016)	-0.024*** (0.008)	0.010 (0.013)	-0.021** (0.009)
Observations	312,430	134,713	312,430	134,713
R-squared	0.927	0.429	0.918	0.429
Avg dep var	10.09	0.176	10.09	0.176
SD dep var	1.669	0.280	1.669	0.280
Establishment FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: This table illustrates the heterogeneous effects of the audit across local firms. The table reports the coefficients obtained from the estimation of equation 6.4. The specification is $y_{f_{mt}} = \alpha_f + \gamma_1 \times Z_f \times PostAudit_{mt} + \beta \times PostAudit_{mt} + \epsilon_{f_{mt}}$, and is discussed in Section 6.3. The sample includes all firms in PAC and PAS surveys located in municipalities audited in the period 2003-2014 and in eligible non-audited municipalities, and covers the window [-1,3] years around the audit year. *Sales per Emp* is the logarithm of total sales over total employment; *Investment* is defined as total capital expenditure over total assets. *PostAudit_{mt}* is an indicator variable taking value 1 for all years after the audit in the audited municipality, and 0 otherwise. *PostAudit_{mt}* is always 0 for never treated municipalities. Z_f are two firm characteristics, as indicated in the top labels: *GD-Procurement* is an indicator for belonging to a GD-Procurement sector; *GD-Corrupt* is an indicator for belonging to a GD-Corrupt sector. All specifications include firm and year fixed effects. *Avg dep var* and *SD dep var* are computed using firms in eligible non-audited municipalities and audited municipalities in the year before the audit. Robust standard errors are clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A19
Heterogeneity across local firms: PAC/PAS sample

	(1) GD Procurement	(2) GD Corrupt
PostAudit \times Z	0.015*** (0.004)	0.011*** (0.004)
PostAudit	0.000 (0.004)	0.004 (0.004)
Observations	2,994,238	2,994,238
R-squared	0.851	0.851
Plant FE	Yes	Yes
Year-quarter FE	Yes	Yes
Avg dep var	3.746	3.746
SD dep var	0.624	0.624

Notes: This table illustrates the heterogeneous effects of the audit across local firms restricting the analysis to the samples that overlap with the PAC and PAS databases. The table reports the coefficients obtained from the estimation of equation 6.4. The specification is $y_{f_{mt}} = \alpha_f + \alpha_t + \gamma_3 \times Z_f \times PostAudit_{mt} + \beta \times PostAudit_{mt} + \epsilon_{f_{mt}}$, and is discussed in Section 6.3. The sample includes all establishments in municipalities audited in the period 2003-2014 and all establishments in eligible non-audited municipalities, and covers the window $[-4, +12]$ quarters around the audit quarter. The dependent variable is the log of total employment in the establishment. $PostAudit_{mt}$ is an indicator variable taking value 1 for all quarter-years after the audit in the audited municipality, and 0 otherwise. $PostAudit_{mt}$ is always 0 for never treated municipalities. Z_f are establishment characteristics based on sectors and political connections. In the case of the sector-based measures: $GD-Procurement$ is an indicator for belonging to a GD-Procurement sector and $GD-Corrupt$ is an indicator for belonging to a GD-Corrupt sector. Results are based on the RAIS dataset but focusing on the sectors and firms covered by the PAC and PAS surveys and for establishments and firms with more than 20 employees. All specifications include establishment and year-quarter fixed effects. *Avg dep var* and *SD dep var* are computed using establishments in eligible non-audited municipalities and audited municipalities in the year before the audit. Robust standard errors are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE A20
Politically connected firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Average	Median	Standard deviation	90th perc	10th perc	Average	Median	Standard deviation	90th perc	10th perc	Average	Median	Standard deviation	90th perc	10th perc
	Panel A: Firm donor					Panel B: Manager donor					Panel C: Politician				
Share of PC employment	0.012	0	0.062	0.013	0	0.009	0	0.055	0.0004	0	0.002	0	0.025	0	0
Share of PC establishments	0.003	0	0.017	0.007	0	0.001	0	0.009	0.001	0	0.0003	0	0.005	0	0
Share of PC employment in GD-P	0.011	0	0.057	0.008	0	0.006	0	0.042	0	0	0.0008	0	0.018	0	0
Share of PC employment in GD-C	0.011	0	0.057	0.007	0	0.005	0	0.042	0	0	0.0008	0	0.018	0	0
Share of PC establishments in GD-P	0.005	0	0.028	0.006	0	0.001	0	0.012	0	0	0.0002	0	0.007	0	0
Share of PC establishments in GD-C	0.005	0	0.028	0.005	0	0.002	0	0.013	0	0	0.0002	0	0.008	0	0
Share of PC employment in Non-GD-P	0.010	0	0.064	0	0	0.008	0	0.062	0	0	0.002	0	0.028	0	0
Share of PC employment in Non-GD-C	0.010	0	0.063	0	0	0.008	0	0.061	0	0	0.002	0	0.028	0	0
Share of PC establishments in Non-GD-P	0.002	0	0.014	0	0	0.002	0	0.013	0	0	0.0003	0	0.006	0	0
Share of PC establishments in Non-GD-C	0.002	0	0.013	0	0	0.002	0	0.012	0	0	0.0002	0	0.005	0	0
	Panel D: Candidate					Panel E: Party member					Panel F: Any connection				
Share of PC employment	0.007	0	0.053	0	0	0.195	0.118	0.222	0.526	0	0.201	0.127	0.224	0.534	0
Share of PC establishments	0.001	0	0.008	0	0	0.050	0.045	0.055	0.106	0	0.054	0.048	0.057	0.111	0
Share of PC employment in GD-P	0.004	0	0.036	0	0	0.151	0.073	0.195	0.428	0	0.159	0.083	0.199	0.440	0
Share of PC employment in GD-C	0.004	0	0.034	0	0	0.145	0.066	0.191	0.412	0	0.152	0.075	0.195	0.426	0
Share of PC establishments in GD-P	0.001	0	0.011	0	0	0.049	0.038	0.068	0.111	0	0.054	0.042	0.074	0.125	0
Share of PC establishments in GD-C	0.001	0	0.012	0	0	0.049	0.037	0.067	0.112	0	0.054	0.041	0.073	0.125	0
Share of PC employment in Non-GD-P	0.007	0	0.060	0	0	0.190	0.069	0.250	0.587	0	0.194	0.075	0.252	0.595	0
Share of PC employment in Non-GD-C	0.007	0	0.060	0	0	0.192	0.075	0.250	0.587	0	0.197	0.080	0.252	0.594	0
Share of PC establishments in Non-GD-P	0.001	0	0.011	0	0	0.052	0.037	0.075	0.125	0	0.054	0.039	0.077	0.127	0
Share of PC establishments in Non-GD-C	0.001	0	0.011	0	0	0.052	0.038	0.075	0.125	0	0.054	0.040	0.076	0.125	0

Notes: This table shows the relevance of politically connected firms across all eligible municipalities. The variables that capture a firm's political connection status are: *Firm Donor* for firm that donated to a political campaign, *Manager Donor* for firms whose manager donated to a political campaign, *Politician* for firms whose manager was an elected politician, *Candidate* for firms whose manager was a political candidate (elected or not), *Party Member* for firms whose manager was a registered member of a political party, and *Any connection* for firms with any type of connection. We present the summary statistics for shares taken at the municipality-year-quarter level. These shares are computed as the total employment (establishments) in politically connected firms over the total employment (establishments) in the private sector. When taking the share in GD-P (GD-C/Non-GD-P/Non-GD-C), we use the total employment (establishments) in politically connected firms and in a GD-Procurement (Corrupt/Non-GD Procurement/Non-GD-Corrupt) sector over the total employment (establishments) in the GD-Procurement (Corrupt/Non-GD Procurement/Non-GD-Corrupt) and private sector.

A.2. MODEL

We introduce corruption distortions in a standard monopolistic competition framework of heterogeneous firms. This stylized model is used to illustrate the intuition behind our empirical analysis by means of a set of testable predictions. We consider only the static one-period version of the model and its essential ingredients.

A.1. Preferences

Consumer preferences are defined over the consumption of goods produced in J sectors:

$$U = \sum_{j=0}^J \beta_j \log Q_j, \quad \sum_{j=0}^J \beta_j = 1, \beta_j \geq 0 \quad (\text{A1})$$

Sector $j=0$ is the numeraire, which refers to a homogeneous good produced with a unit input requirement. Within each of the remaining $j \geq 1$ sectors, there is a continuum of horizontally differentiated varieties, and preferences take the Constant Elasticity of Substitution (CES) form:

$$Q_j = \left[\int_{i \in \Omega_j} q_{ji}^{(\sigma_j - 1)/\sigma_j} di \right]^{\sigma_j / (\sigma_j - 1)}, \quad \sigma_j > 1, j \geq 1. \quad (\text{A2})$$

Note that $i \in \Omega_j$ indexes the universe of differentiated goods in the industry as well as the universe of firms. Moreover, notice that for the sake of simplicity, we do not model government's preferences explicitly and differently from consumer preferences. The demand for each differentiated variety within sector j is given by:

$$q_{ji} = (1 - \tau_i) A_j p_{ji}^{-\sigma_j}, \quad A_j = X_j P_j^{\sigma_j - 1} \quad (\text{A3})$$

$$X_j = \beta_j Y, \quad P_j = \left[\int_{i \in \Omega_j} p_{ji}^{1 - \sigma_j} di \right]^{1 / (1 - \sigma_j)}$$

where Y denotes the aggregate income, X_j denotes the fraction consumers spend on goods from industry j , P_j is the price index, and A_j represents an index of market demand taken as given by firms, which proportionally scales every firm's residual demand.

In a world with corruption, firm-level demand is subject to a wedge. That is, each firm will face a corruption wedge $\tau \in (-\infty, 1)$, which is heterogeneous across firms in a given industry. Some firms could have $\tau < 0$, thus receiving a subsidy on their demand. Other firms could have $\tau \in (0, 1)$, and be subject to a tax on their demand. The case of $\tau \equiv 0$ is one with no corruption-induced heterogeneity across firms within a sector (which could be thought of as a non-government dependent firm). We assume all the revenues accrued because of $\tau > 0$ are not spent on the local economy, as they are instead stolen and wasted by politicians.

A.2. Technology

Firms in sector j produce varieties using a composite factor of production L_j , at unit cost w_j , and sector 0 is characterized by $w_0 = 1$. Within each industry, each firm chooses to supply a distinct horizontally differentiated variety. To produce, all firms need to incur a fixed cost f_j . There is also a constant marginal cost that is inversely proportional to firm productivity φ_i . The total amount of input required for firm i in industry j to produce $q_{ji}(1 - \tau_i)$ units of a variety is:

$$l_{ji} = f_j + \frac{q_{ji}(1 - \tau_i)}{\varphi_i} \quad (\text{A4})$$

A.3. Firm Behavior

In equilibrium, firms maximize profits by choosing a price that is a constant mark-up over marginal cost. The first order condition (FOC) yields:

$$p_{ji} = \frac{\sigma_j}{\sigma_j - 1} \frac{w_j}{\varphi_i} \quad (\text{A5})$$

As a result, revenue is given by:

$$r_{ji} = r_j(\varphi_i, \tau_i) = (1 - \tau_i) A_j p_{ji}^{1 - \sigma_j} = (1 - \tau_i) A_j \left[\frac{\sigma_j - 1}{\sigma_j} \right]^{\sigma_j - 1} w_j^{1 - \sigma_j} \varphi_i^{\sigma_j - 1} \quad (\text{A6})$$

while profits are given by:

$$\begin{aligned} \pi_{ji} &= \pi_j(\varphi_i, \tau_i) = \frac{r_j(\varphi_i, \tau_i)}{\sigma_j} - w_j f_j = (1 - \tau_i) B_j \varphi_i^{\sigma_j - 1} - w_j f_j \\ B_j &= \frac{(\sigma_j - 1)^{\sigma_j - 1}}{\sigma_j^{\sigma_j}} w_j^{1 - \sigma_j} A_j \end{aligned} \quad (\text{A7})$$

A.4. Firm Entry And Exits

The zero profits condition is the following:

$$\pi_j(\varphi_i^*, \tau_i^*) = (1 - \tau_i^*) B_j (\varphi_i^*)^{\sigma_j - 1} - w_j f_j = 0 \quad (\text{A8})$$

while the free entry condition can be obtained as:

$$\int_{-\infty}^1 \int_{\varphi_i^*}^{+\infty} [(1 - \tau_i) B_j (\varphi_i)^{\sigma_j - 1} - w_j f_j] dG(\varphi) dH(\tau) = w_j (f_E)_j \quad (\text{A9})$$

After a firm pays $(f_E)_j$ to enter an industry, it draws its productivity φ from $G(\varphi)$ and its corruption tax parameter τ from $H(\tau)$. As illustrated in Figure A6, the combination (φ_i^*, τ_i^*) gives a boundary such that firms in the upper-left of the area will continue producing, while others will exit. $(f_E)_j$ is the sunk entry cost.

A.5. Equilibrium

General equilibrium can be characterized by the following variables for each sector: the survival productivity and corruption tax boundary (φ_i^*, τ_i^*) , the price w_j , the supply of the composite input L_j , the mass of entrants $(M_E)_j$, and aggregate expenditure X_j .

A.5.1. Sectoral Equilibrium. The zero-profit condition (A8) and the free entry condition (A9) provide two equations involving three endogenous variables: φ^* , τ^* and market demand B/w . Combining these two conditions, we obtain a single equation that determines the boundary:

$$\begin{aligned} f_j J(\varphi_i^*, \tau_i^*) &= (f_E)_j \\ J(\varphi_i^*, \tau_i^*) &= \int_{-\infty}^1 \int_{\varphi^*}^{+\infty} \left[\left(\frac{1 - \tau_i}{1 - \tau_i^*} \right) \left(\frac{\varphi_i}{\varphi_i^*} \right)^{\sigma_j - 1} - 1 \right] dG(\varphi) dH(\tau) \end{aligned} \quad (\text{A10})$$

J is monotonically decreasing with respect to φ_i^* and increasing with respect to τ . The limit of J with τ_i approaching 1 and φ_i approaching 0 approaches ∞ , while the limit with τ_i approaching $-\infty$ and φ_i approaching ∞ approaches 0.

We can then write down firm performance in terms of φ_i , τ_i , and market demand B/w :⁵⁹

$$\begin{aligned}\frac{p(\varphi_i, \tau_i)}{w} &= \frac{\sigma}{\sigma-1} \frac{1}{\varphi_i} \\ \frac{\pi(\varphi_i, \tau_i)}{w} &= (1-\tau_i) \frac{B}{w} \varphi_i^{\sigma-1} - f \\ \frac{r(\varphi_i, \tau_i)}{w} &= \sigma \left[\frac{\pi(\varphi_i, \tau_i)}{w} + f \right] \\ q(\varphi_i, \tau_i) &= \frac{r(\varphi_i, \tau_i)}{(1-\tau_i)p(\varphi_i, \tau_i)} \\ l(\varphi_i, \tau_i) &= \frac{(1-\tau_i)q(\varphi_i, \tau_i)}{\varphi_i} + f\end{aligned}\tag{A11}$$

This setting ensures that sector aggregates such as expenditures and input supply do not affect the firm selection boundary and the distribution of any firm performance measure in equilibrium. Sector aggregates will only affect the mass of firms in the sector. We can look at properties of the distribution of the firm performance measures, so as to derive the relationship between sector aggregates and the mass of firms. We can first pin down the average profits and revenue of active firms using the free entry condition (A9):

$$\begin{aligned}\frac{\bar{\pi}}{w} &= \frac{f_E}{\int_{-\infty}^1 \int_{\varphi^*}^{+\infty} dG(\varphi) dH(\tau)} = \frac{f_E}{\int_{-\infty}^1 [1-G(\varphi^*)(\tau)] dH(\tau)} = \frac{f_E}{1-E[G(\varphi^*(\tau))]} \\ \frac{\bar{r}}{w} &= \sigma \left(\frac{\bar{\pi}}{w} + f \right)\end{aligned}\tag{A12}$$

The representative firm's productivity is given by:

$$\tilde{\varphi}^{\sigma-1} = \frac{\int_{-\infty}^1 \int_{\varphi^*}^{+\infty} \varphi^{\sigma-1} dG(\varphi) dH(\tau)}{\int_{-\infty}^1 \int_{\varphi^*}^{+\infty} dG(\varphi) dH(\tau)}\tag{A13}$$

The corresponding $\tilde{\tau}$ is pinned down by the average profit. This indicates a hypothetical monopolistic competition equilibrium with M representative firms sharing the same productivity and corruption tax parameter. Given the same input supply L and expenditures X for the sector, the hypothetical equilibrium with representative firms would also feature the same mass M of active firms.

In the heterogeneous firm setting, the M active firms represent the portion of the mass of entrants M_E that survive. This portion is pinned down by the boundary of (φ^*, τ^*) , so that $M = [1 - E[G(\varphi^*(\tau))]] M_E$. The sector's input supply L is used both for production by the M active firms and to cover the sunk cost of all entrants. The factor market equilibrium condition equating demand and supply for the sector's composite input is as follows:

$$L = \frac{R - \Pi}{w} + M_E f_E\tag{A14}$$

59. Since we are considering a sectoral equilibrium, we now drop the sector subscript.

The free entry condition ensures that aggregate profits cover the aggregate entry cost: $\Pi = M\bar{\pi} = wM_E f_E$. Therefore, aggregate sector revenue is determined by the input supply: $R/w = L$. In a closed economy this must also equal the sector's expenditure X/w . In our sector with corruption wedges, a certain proportion of the total expenditures are stolen and wasted by politicians, and thus $\frac{R}{w} = \frac{X(1-E[\tau])}{w}$.⁶⁰

A.5.2. General Equilibrium. We close the economy by fixing a single factor of production (labor \bar{L}) that is mobile across sectors and indexes the size of economy. Labor mobility ensures that the wage w is the same for all sectors j , and $w_j = w_0 = 1$ for the numeraire.

With the zero-profit cutoff boundaries (φ^*, τ^*) and w determined, the other elements of the equilibrium vector follow immediately. Aggregate income is $Y = w\bar{L}$ and industry revenue and expenditure follow from $R_j = X_j(1-E[\tau]) = \beta_j Y(1-E[\tau]) = \beta_j w\bar{L}(1-E[\tau])$. Therefore, the mass of firms in each sector is as follows:

$$M_j = \frac{R_j}{r_j} = \frac{\beta_j \bar{L}(1-E[\tau])}{\sigma_j [1 - E[G(\frac{wf}{B(1-\tau)})]] + f_j} \quad (\text{A16})$$

A.6. Effects of An Anti-corruption Program

We model the anti-corruption audit as a shock that reduces the corruption wedge τ (i.e., $|\tau| \downarrow$). Without loss of generality, let us assume that after the audit $\tau \equiv 0$ for every firm.

Proposition 1 (Government-Dependent Sectors). *After an audit, the total number of firms increases if the productivity has a lower bound larger than $\frac{wf}{B}$, and if there exists a large enough τ such that $G(\frac{wf}{B(1-\tau)}) > 0$. Hence, the number of firms increases more in sectors where the average τ is higher.*

Proof:

To show that the number of firms increases after the audit program, we would have to show that:

$$1 - G(\frac{wf}{B}) > 1 - E[G(\frac{wf}{B(1-\tau)})] \quad (\text{A17})$$

60. A simple proof comes from the integration of firm-level revenue:

$$\begin{aligned} R &= \int_{i \in \Omega} \sigma B(1-\tau_i) \varphi_i^{\sigma-1} di = \sigma B \int_{i \in \Omega} (1-\tau_i) \varphi_i^{\sigma-1} di = \sigma B E[\varphi^{\sigma-1}] (1-E[\tau]) \\ B &= \frac{(\sigma-1)^{\sigma-1}}{\sigma^\sigma} w^{1-\sigma} A \\ A &= X P^{\sigma-1} \\ P &= [\int_{i \in \Omega} p^{1-\sigma} di]^{1/(1-\sigma)} = \frac{\sigma w}{\sigma-1} [\int_{i \in \Omega} \varphi^{\sigma-1} di]^{1/(1-\sigma)} \\ B &= \frac{X}{\sigma E[\varphi^{\sigma-1}]} \\ R &= X(1-E[\tau]) \end{aligned} \quad (\text{A15})$$

The expectation can be expressed as an integral, so that:

$$\int_{-\infty}^1 G\left(\frac{wf}{B(1-\tau)}\right)dH(\tau) - G\left(\frac{wf}{B}\right) > 0 \quad (\text{A18})$$

which can be separated into two parts of non-negative integrals:

$$\int_0^1 [G\left(\frac{wf}{B(1-\tau)}\right) - G\left(\frac{wf}{B}\right)]dH(\tau) - \int_{-\infty}^0 [G\left(\frac{wf}{B}\right) - G\left(\frac{wf}{B(1-\tau)}\right)]dH(\tau) > 0 \quad (\text{A19})$$

The lower bound of the productivity indicates that:

$$G(x) = 0, \forall x \leq \frac{wf}{B} \quad (\text{A20})$$

so that (A19) can be rewritten as:

$$\int_0^1 G\left(\frac{wf}{B(1-\tau)}\right)dH(\tau) > 0$$

Due to the non-negativity of $G(\varphi)$ and $dH(\tau)$, we can see that:

$$\int_0^1 G\left(\frac{wf}{B(1-\tau)}\right)dH(\tau) \geq 0$$

To ensure that the integral is strictly positive, we need a τ such that $G\left(\frac{wf}{B(1-\tau)}\right)$ and $dH(\tau)$ are both positive. Suppose that the lower bound of φ is $C > \frac{wf}{B}$, then we would need a τ which satisfies $\frac{wf}{B(1-\tau)} > C$, namely a large enough τ such that:

$$\tau > 1 - \frac{wf}{BC} \quad (\text{A21})$$

To show that an audit leads to a higher increase in number of operating firms in sectors where the average τ is higher, we can show that a sector is harmed by corruption if:

$$\int_0^1 dH(\tau) \gg \int_{-\infty}^0 dH(\tau) \quad (\text{A22})$$

which follows directly from (A19), where the first part of the left hand side is larger than the second part. Indeed, if the probability density of τ concentrates more in $(0,1)$, note that $G\left(\frac{wf}{B(1-\tau)}\right) - G\left(\frac{wf}{B}\right)$ is constant for a given τ , which means there will be higher entry and lower exit of firms.

Proposition 2 (Government-Dependent Firms). *Labor, profits, revenue, and revenue-based productivity are decreasing in τ . This implies that for firms subject to a corruption tax ($\tau > 0$), labor, revenue, profits, and revenue-based productivity increase after the audit. For firms obtaining corruption subsidies ($\tau < 0$), all the performance measures decrease after the audit.*

Proof:

The firm-level predictions are immediately derived by taking the partial derivatives of labor ($l_j(\varphi, \tau)$), revenue ($r_j(\varphi, \tau)$), profits ($\pi_j(\varphi, \tau)$), and revenue-based productivity ($\frac{r_j(\varphi, \tau)}{l_j(\varphi, \tau)}$) with respect to τ ,

namely:

$$\begin{aligned}
\frac{\partial \pi(\varphi, \tau)}{\partial \tau} &= -\frac{B}{w} \varphi^{\sigma-1} < 0 \\
\frac{\partial r(\varphi, \tau)}{\partial \tau} &= \sigma \frac{\partial \pi(\varphi, \tau)}{\partial \tau} < 0 \\
\frac{\partial l(\varphi, \tau)}{\partial \tau} &= -\frac{Ap^{-\sigma}}{\varphi} < 0 \\
\frac{r(\varphi, \tau)}{l(\varphi, \tau)} &= \frac{\sigma w}{\sigma-1} \frac{1}{1 + \frac{(f+c)\frac{w}{\sigma-1}}{B(1-\tau)\varphi^{\sigma-1}}} \\
\frac{\partial \frac{r(\varphi, \tau)}{l(\varphi, \tau)}}{\partial \tau} &= -\frac{\sigma w}{\sigma-1} \frac{1}{\left(1 + \frac{(f+c)\frac{w}{\sigma-1}}{B(1-\tau)\varphi^{\sigma-1}}\right)^2} \frac{(f+c)\frac{w}{\sigma-1}}{B\varphi^{\sigma-1}} \frac{1}{(1-\tau)^2} < 0
\end{aligned}$$

A.7. Visualization and Back-of-the-Envelope Calculation

The basic implications of the model can be illustrated through a simple depiction of the boundary of the combination (φ, τ) , which we show in Figure A6. The red horizontal line is the productivity boundary in a model without corruption taxes, and the black dotted line is the model with corruption. All firms above the lines would enter the market, while those below would exit the market. As is apparent from Figure A6, the higher the τ , the higher the productivity needed to be profitable for the firm to enter the market.

For the simulation in Figure A6, we make several choices. First, we set $w=1$ as in the equilibrium. Therefore, other numerical parameters, such as f for fixed costs, and f_E for sunk costs, can be thought of as ratios of wages, or labor costs. The choice of β and \bar{L} is without loss of generality, and so we choose $\beta=0.1$ and $\bar{L}=2000$. As is standard in the literature, we choose $\sigma=4$. Similarly, we set $f=f_E=0.5$. Finally, for φ , we borrow from the distribution used by Hsieh and Klenow (2009) for China and India. Notice that this set of parameters would imply an increase in the number of firms after the audit in the range of 0.58% to 2.62%, which are indeed in line with our main empirical results.

Using the same calibration choices, we conclude with a back-of-the-envelope calculation to understand what benchmark corruption distortions may rationalize our empirical results. Starting from (A15), we can rewrite the revenue after the audit as:

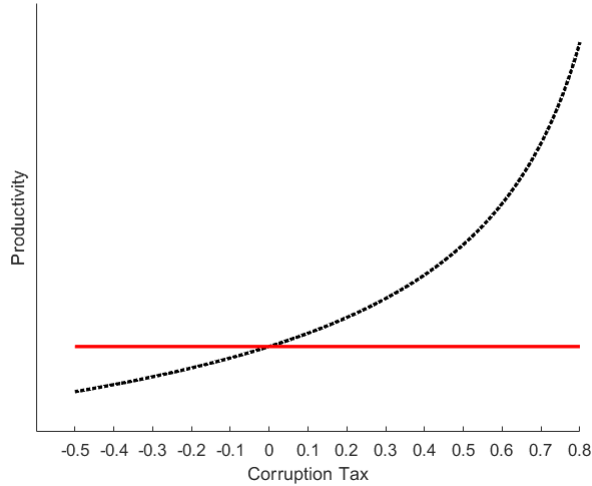
$$R = X[1 - (1-x\%)E[\tau]] \quad (\text{A23})$$

where x denotes the percentage decrease in the corruption tax. Since the municipal budget remains constant after the audit, X does not change. As a result, the increase in total revenues R is given by:

$$\Delta R\% = \frac{[1 - (1-x\%)E[\tau]] - (1-E[\tau])}{1-E[\tau]} = \frac{x\%E[\tau]}{1-E[\tau]} = \frac{x\%}{\frac{1}{E[\tau]} - 1} \quad (\text{A24})$$

We know from Avis, Ferraz, and Finan (2018) that audits reduce corruption by 20%, hence we can set $x=20$. Similarly, while we do not observe the impact of audits on total revenues for all firms in the economy, we can provide an estimate that ranges from 1% (from Table 3 on number of firms) to 6% (from Table 4 on total sales for firms in the PAC/PAS census datasets). Using this range of estimates, we can back out the average corruption tax faced by firms that would be needed to rationalize our findings. For example, assuming $\Delta R\%=2\%$, we can see that $\frac{1}{\frac{1}{E[\tau]} - 1} = 0.1$, which leads to an average

FIGURE A6
Visualization Of productivity boundary



Notes: This figure illustrates the basic intuition of the model. The two axes are the firm level productivity and corruption wedge, respectively. The red horizontal line represents the minimum productivity above which firms can profitably operate when there are no corruption distortions. The black dotted line shows instead the minimum productivity above which firms can profitably operate in presence of corruption distortions. The two lines intersect at $\tau=0$. This implies that higher levels of distortions change the firms' performance and the compositions of firms that decide to enter the market. The simulation assumes the following: $f=0.5$, $\beta=0.1$, $\bar{L}=2000$, $\sigma=3$, $w=1$.

corruption tax of $E[\tau]=\frac{1}{11}=9.1\%$. In Table A21 we report the range of back of the envelope estimates for the average corruption tax, depending on different values of ΔR . We find a corruption tax in the range of 5%-23% to fit our empirical findings.

TABLE A21
Range for corruption tax

$\Delta R\%$	$E[\tau]$
1	4.8%
2	9.1%
3	13.0%
4	16.7%
5	20.0%
6	23.1%