

# Regulation, Enforcement, and Competition: Evidence from the Spanish Local TV Industry

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NET institute June 2013

# Motivation

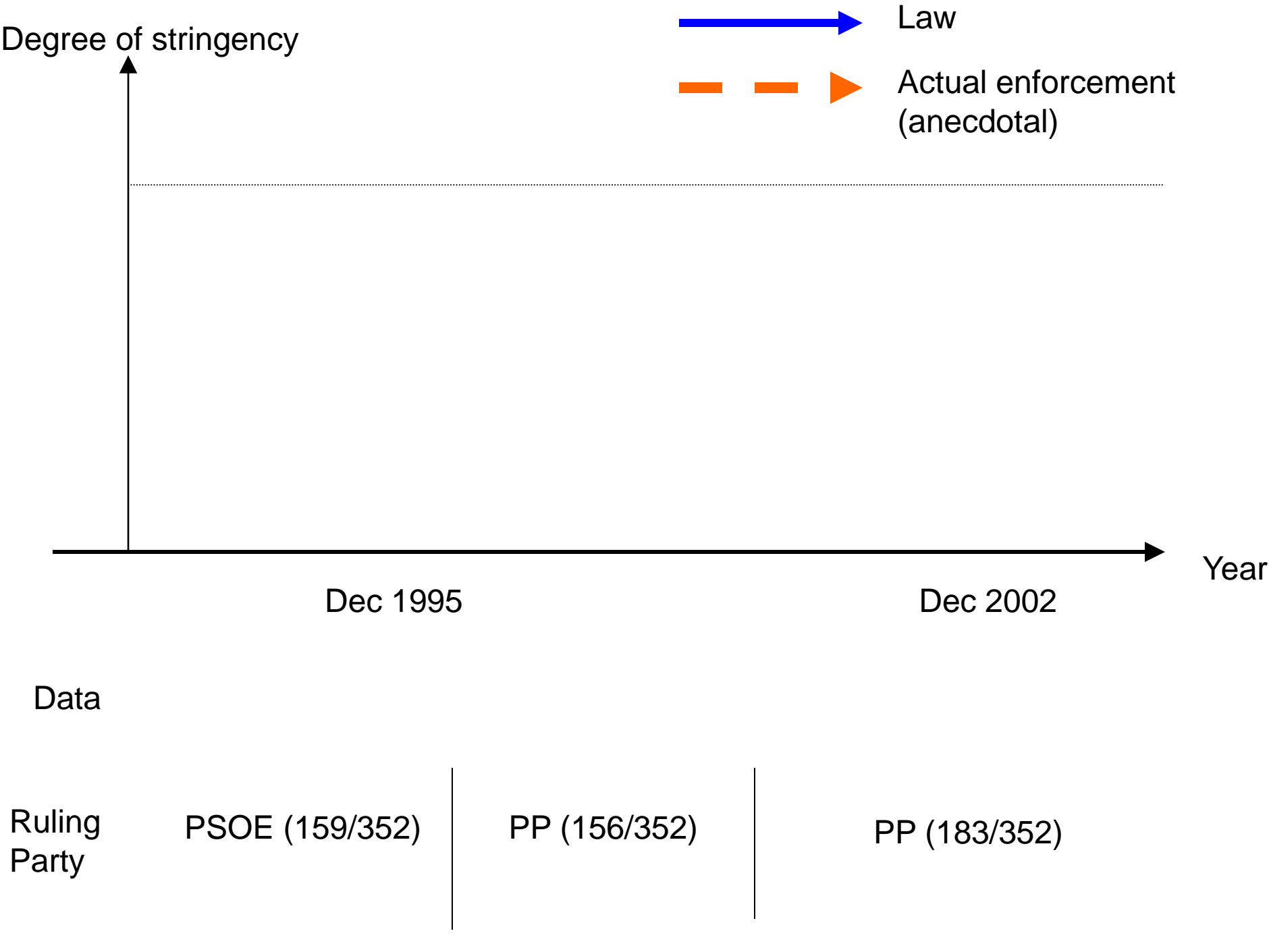
- Studies on regulation and competition take regulation as given, and use as a constraint to an equilibrium model to obtain the effect of policy on market outcome
- What is the role of enforcement in regulation?
- In Spanish local TV industry, obvious violations of the regulation occur: underwent several different regulation statuses from alegal (no regulation), regulation, and “silent” deregulation (lax enforcement)
- We infer from the data to what extent the regulation was enforced and in which way the enforcement impacted how the local TV stations compete

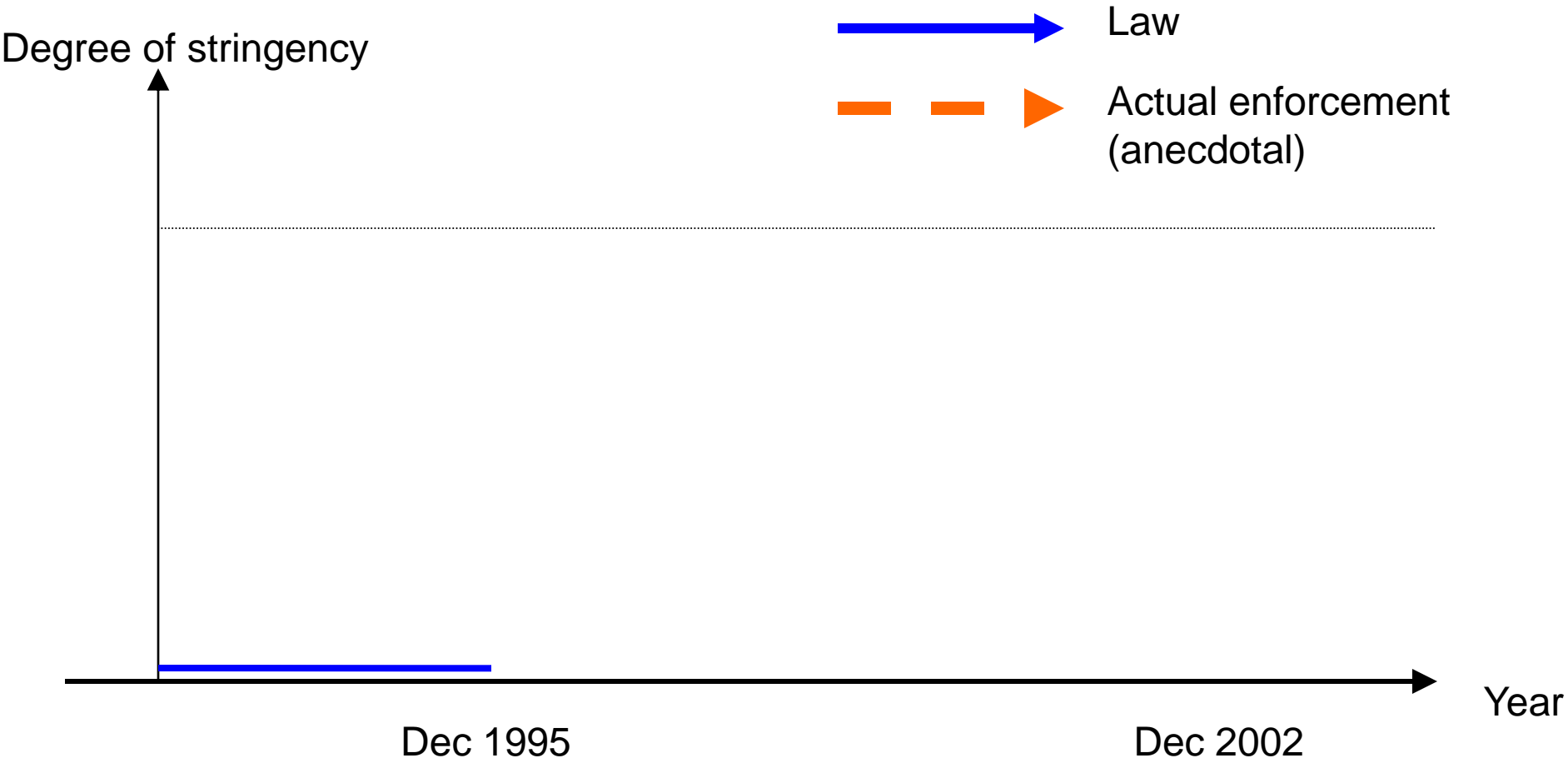
# Literature

- Regulation and competition:  
Joskow (1973), Samprone (1979), Armstrong and Vickers (1993), Vickers (1995), Danzon and Chao (2000)
- Static entry games:  
Bresnahan and Reiss (1990,1991,1994), Mazzeo (2002), Seim (2006), Jia (2008), Bajari et al. (2010a 2010b), Grieco (2012)
- Effect of regulation on entry:  
Griffith and Harmgart (2008), Schaumans and Verboven (2008), Cohen et al. (2010), Suzuki (2012), Datta and Sudhir (2012), Ryan (2012), Nishida (2013)
- Telecommunication industries:  
Berry and Waldfogel (1999), Goolsbee and Petrin (2004), Xiao and Orazem (2011), Crawford and Yurukoglu (2012), Gil and Ruzzier (2012)

# Local TV Regulation in Spain

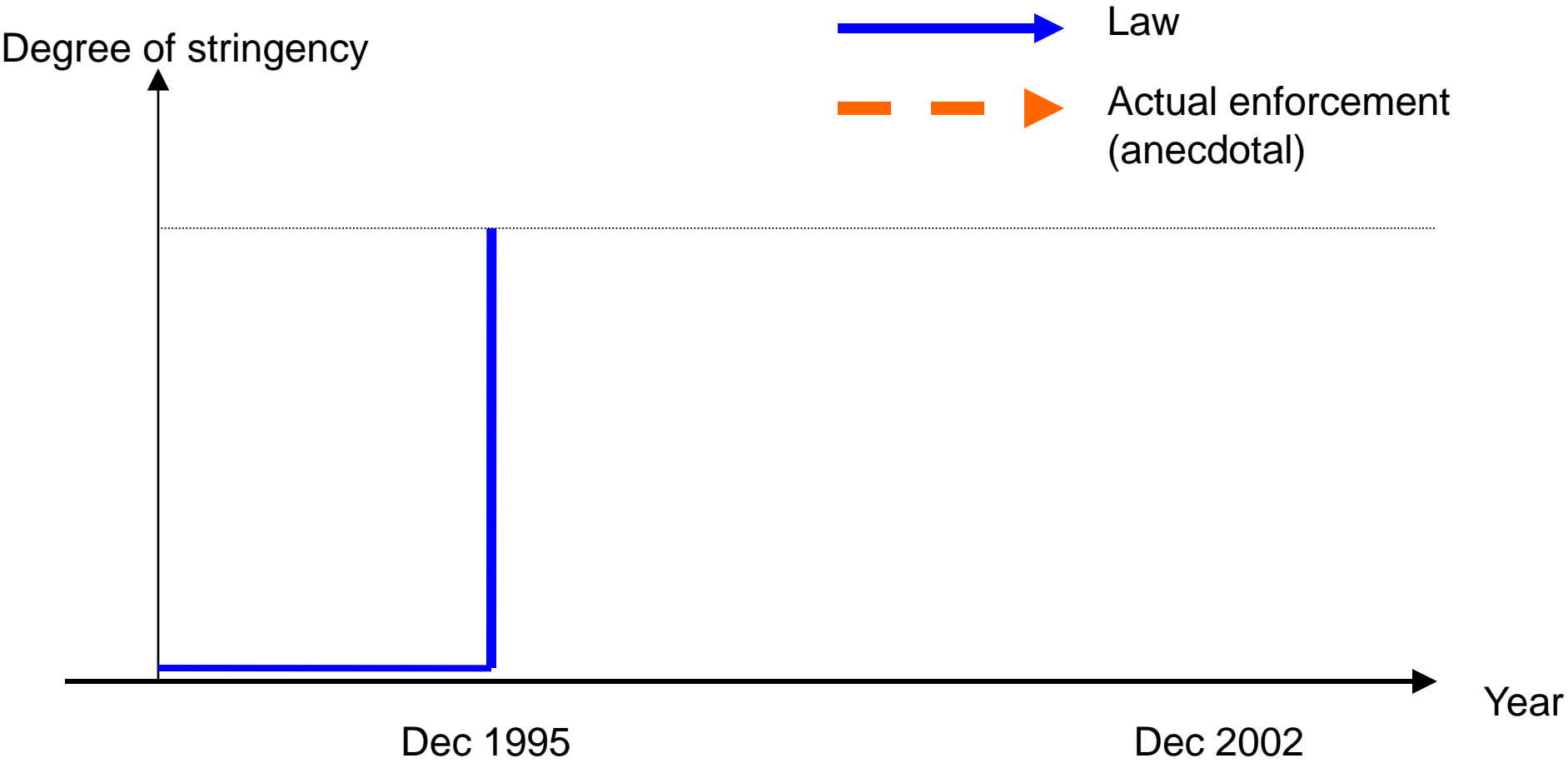
- Mid 1980s-1995: regulation for regional stations but no regulation for local stations
- 1st regulation: December 1995 law
  - ▶ Limited to the geographical boundaries to city
  - ▶ No more than two stations allowed per city
  - ▶ No network formation
  - ▶ Need to have local government personnel on advisory and executive boards (if private)
- 2nd regulation: December 2002 law
  - ▶ Number of stations proportional to population
  - ▶ No restriction on network formation
  - ▶ No need for local government personnel on advisory and executive boards





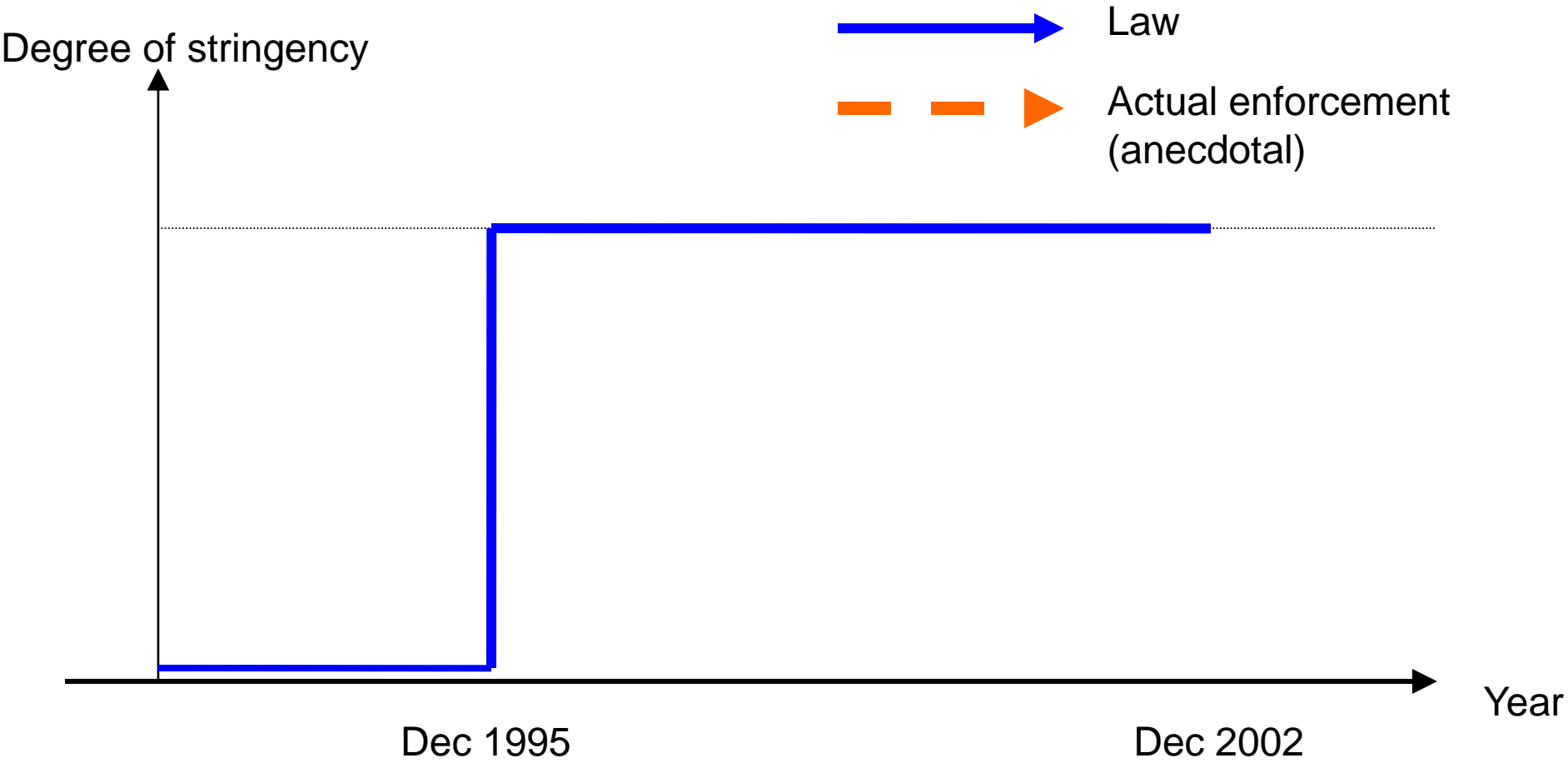
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| Ruling Party | PSOE (159/352) | PP (156/352) | PP (183/352) |
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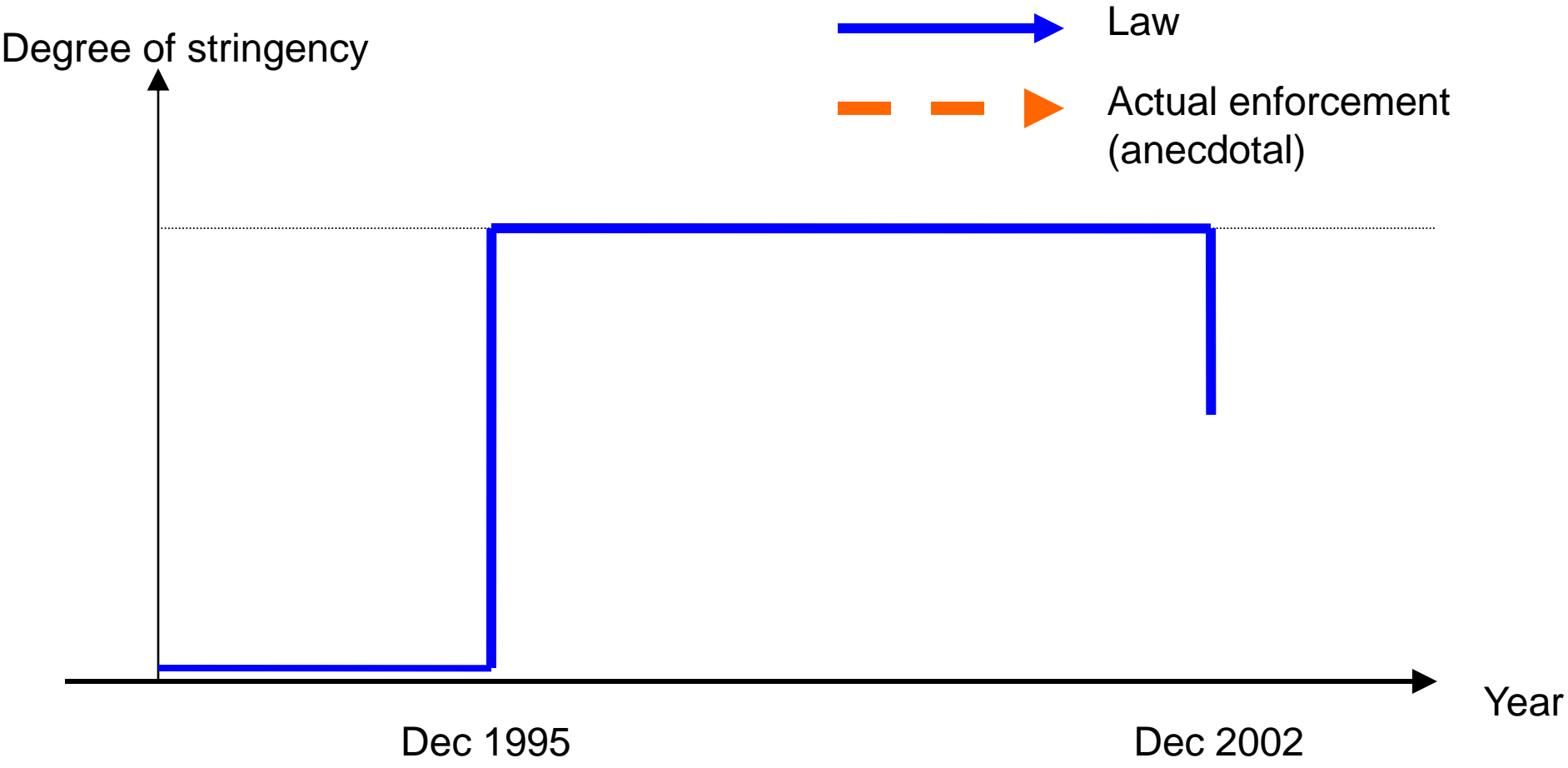
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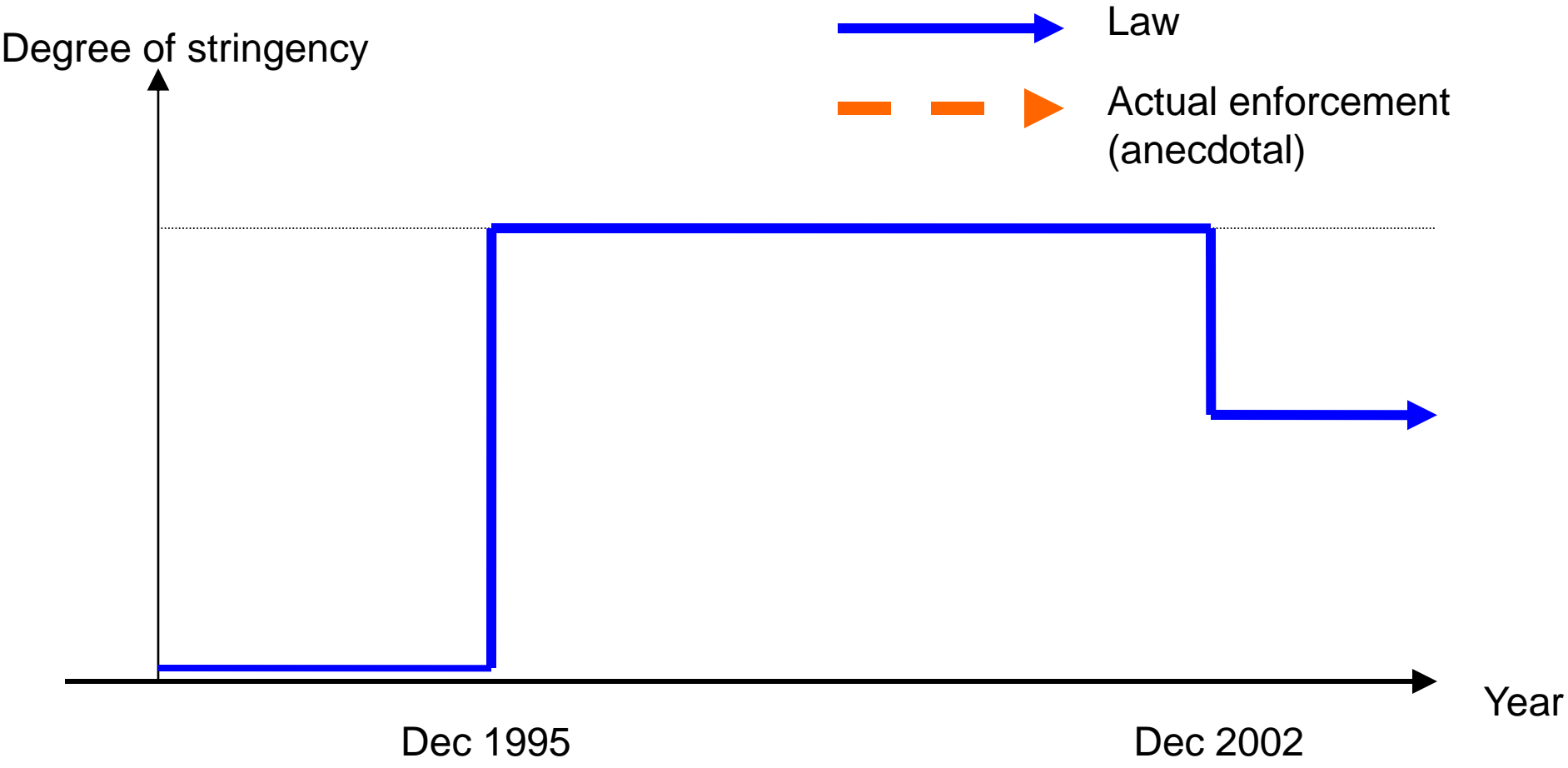
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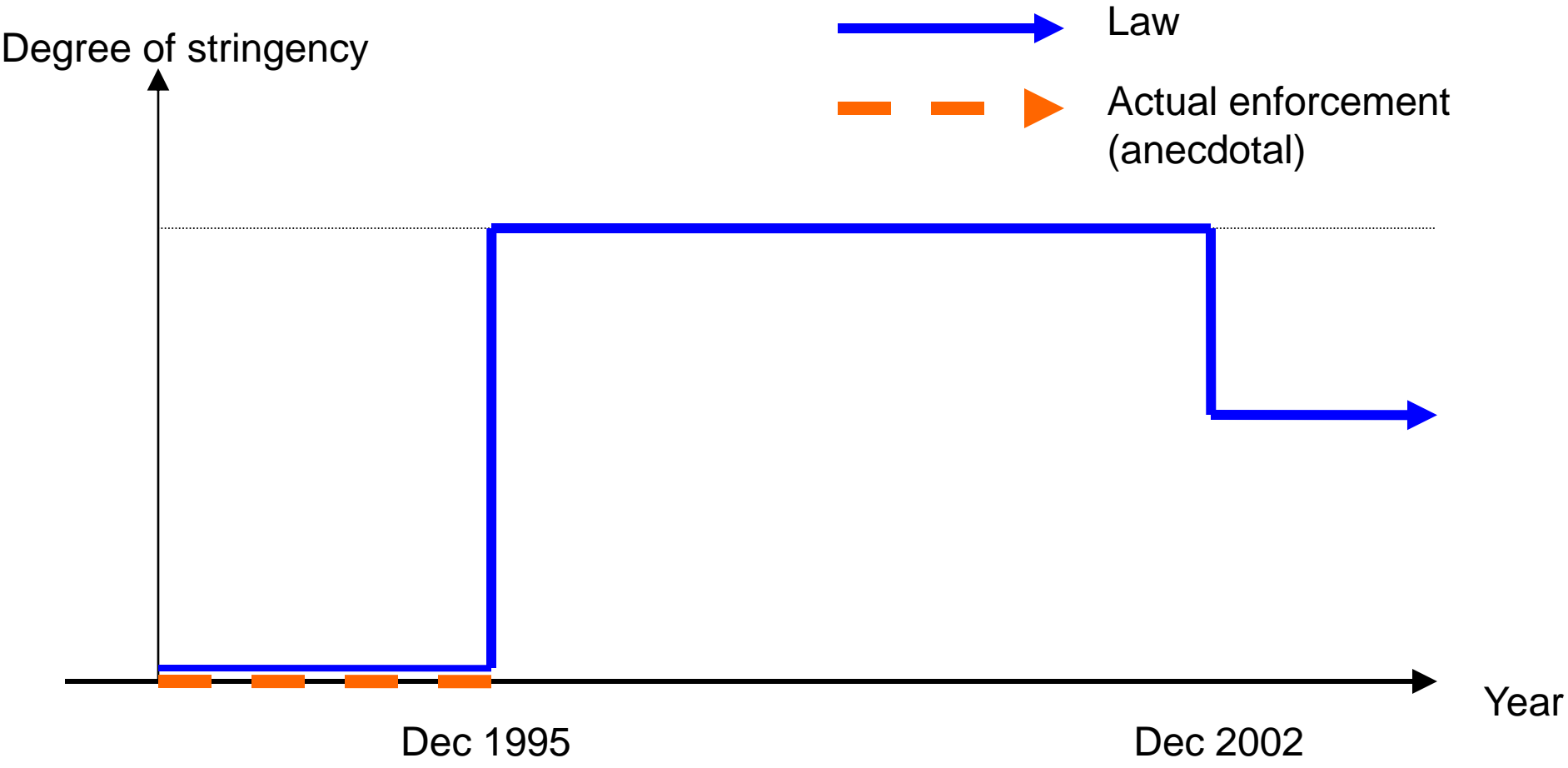
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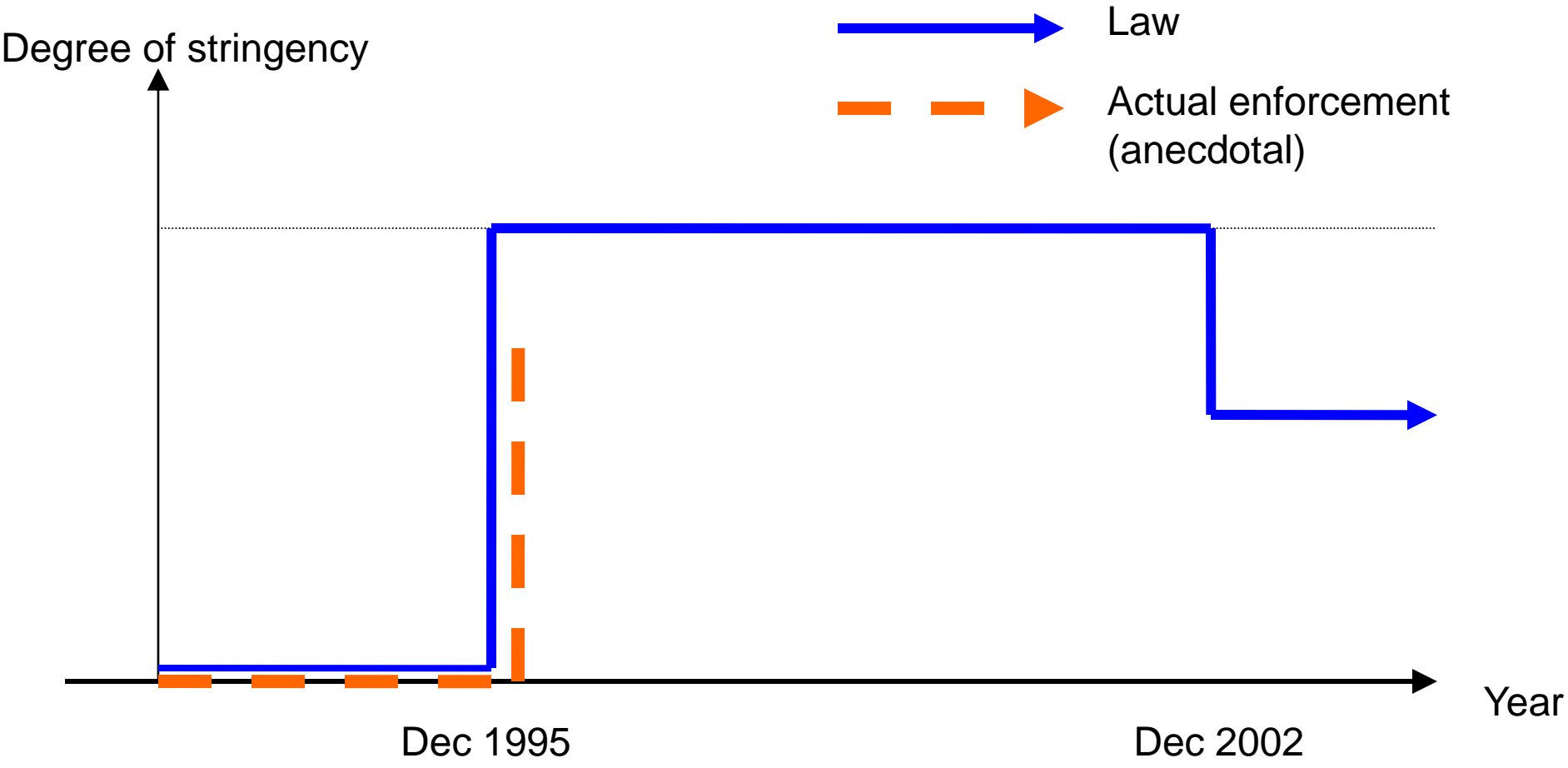
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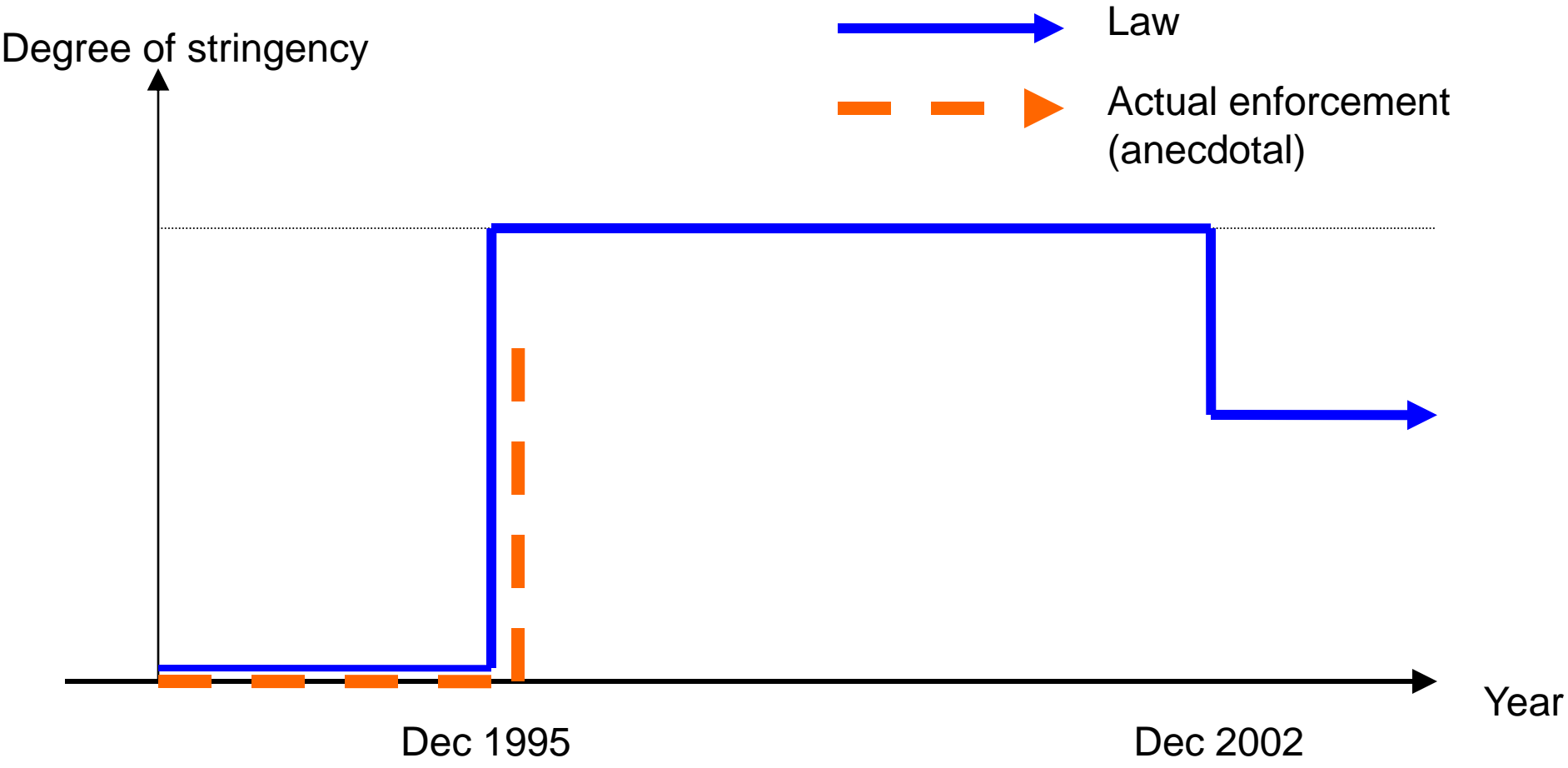
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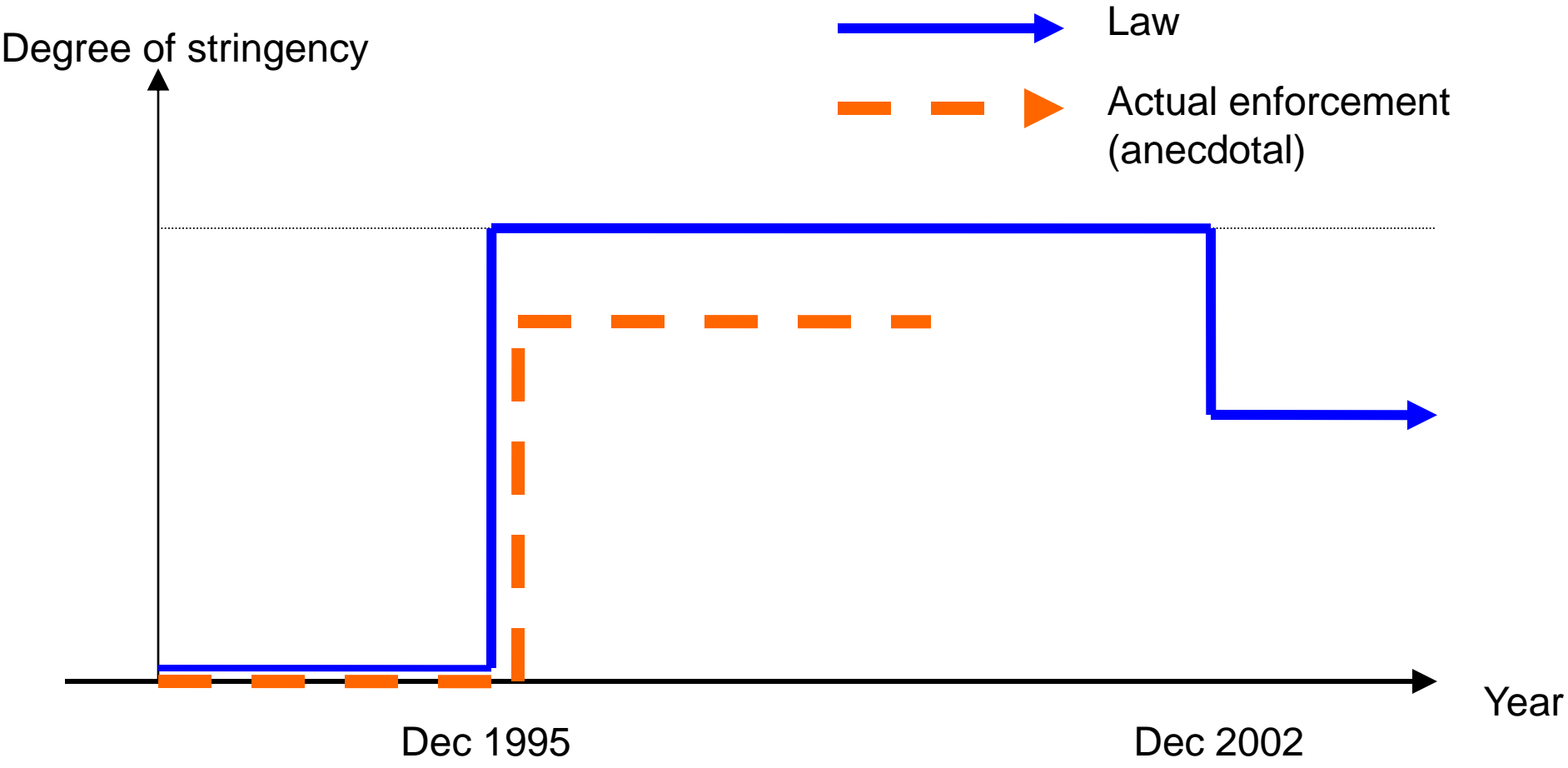
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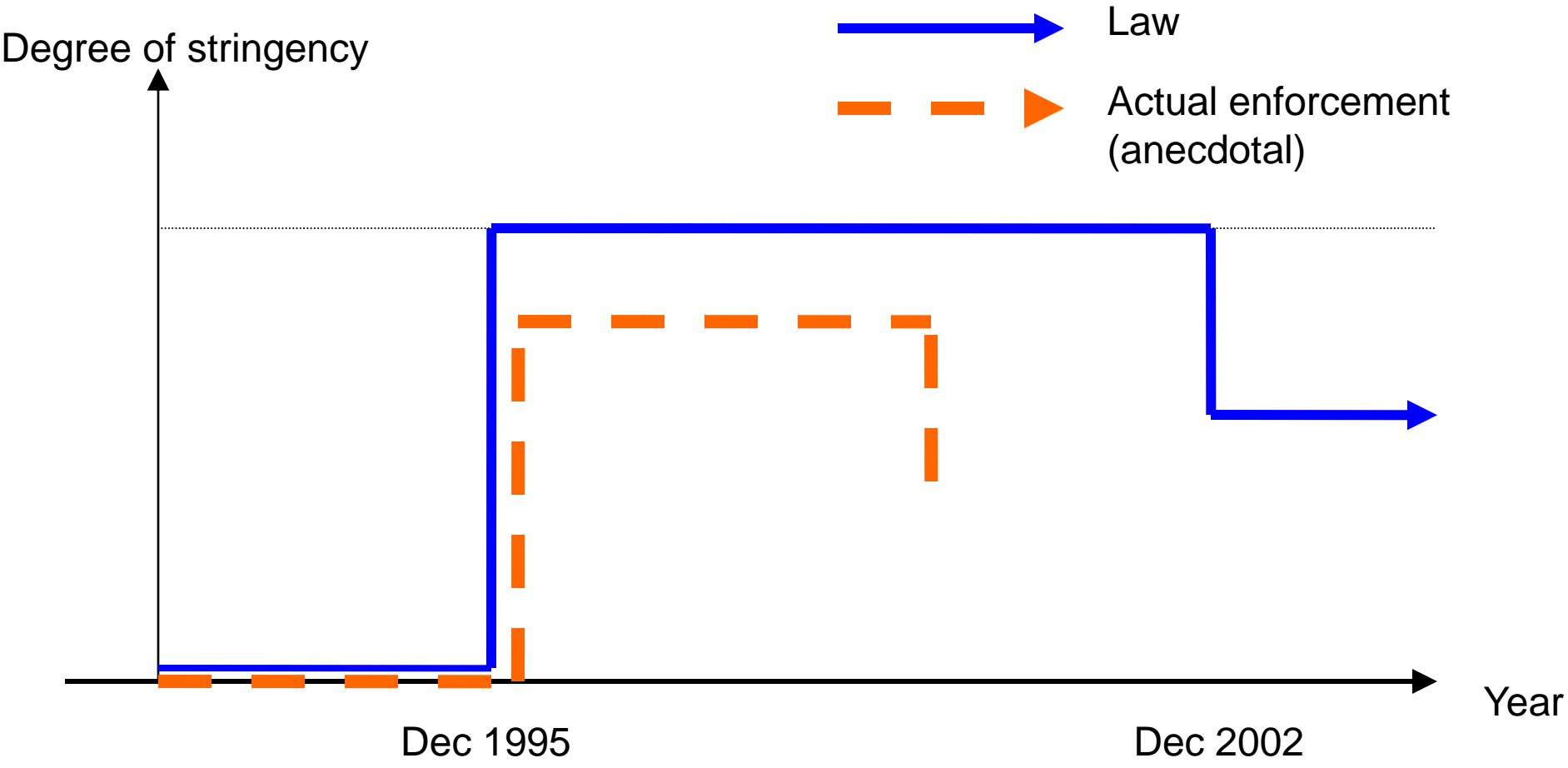
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Ruling  
Party

PSOE (159/352)

PP (156/352)

PP (183/352)



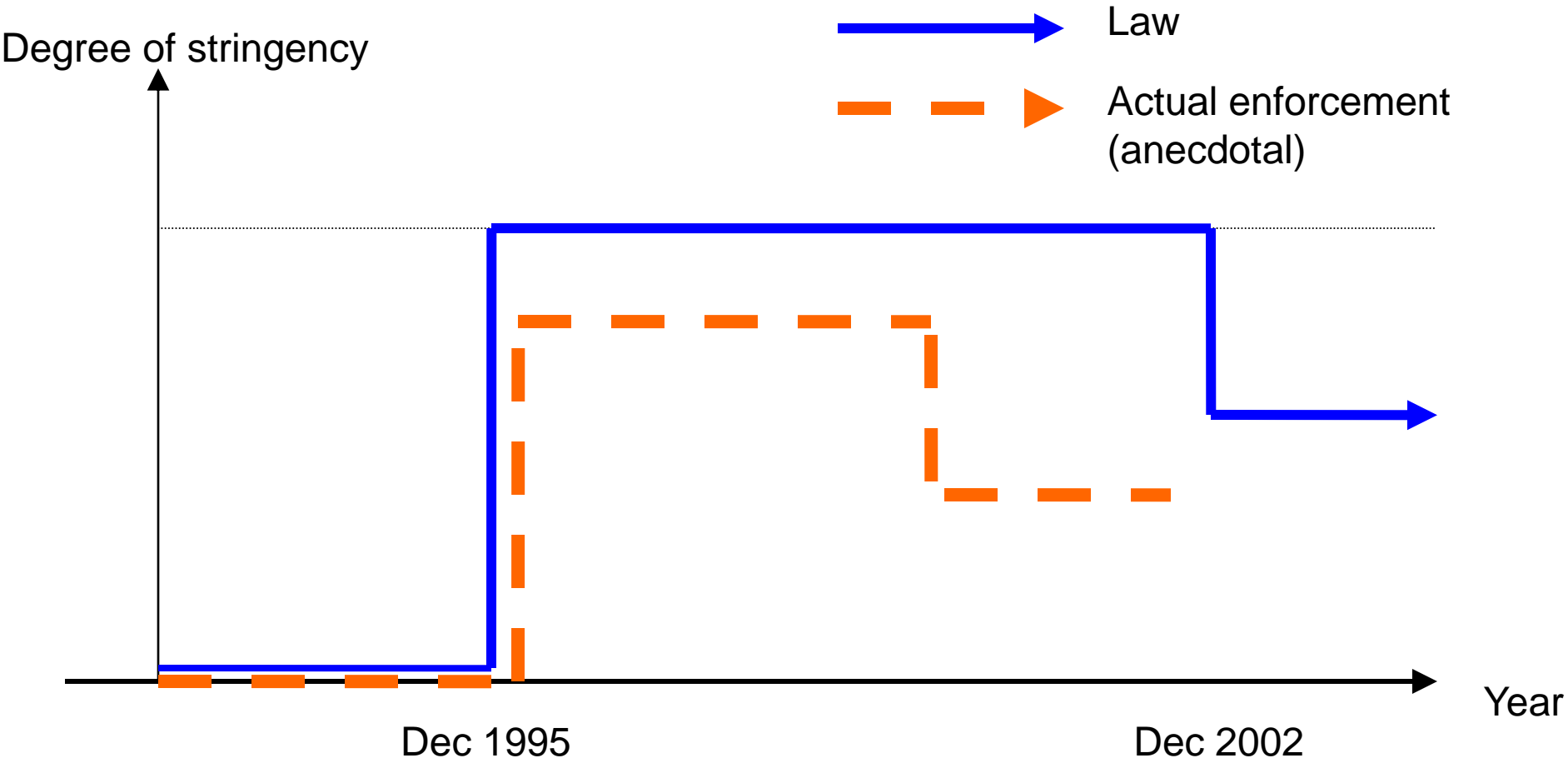
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Ruling  
Party

PSOE (159/352)

PP (156/352)

PP (183/352)



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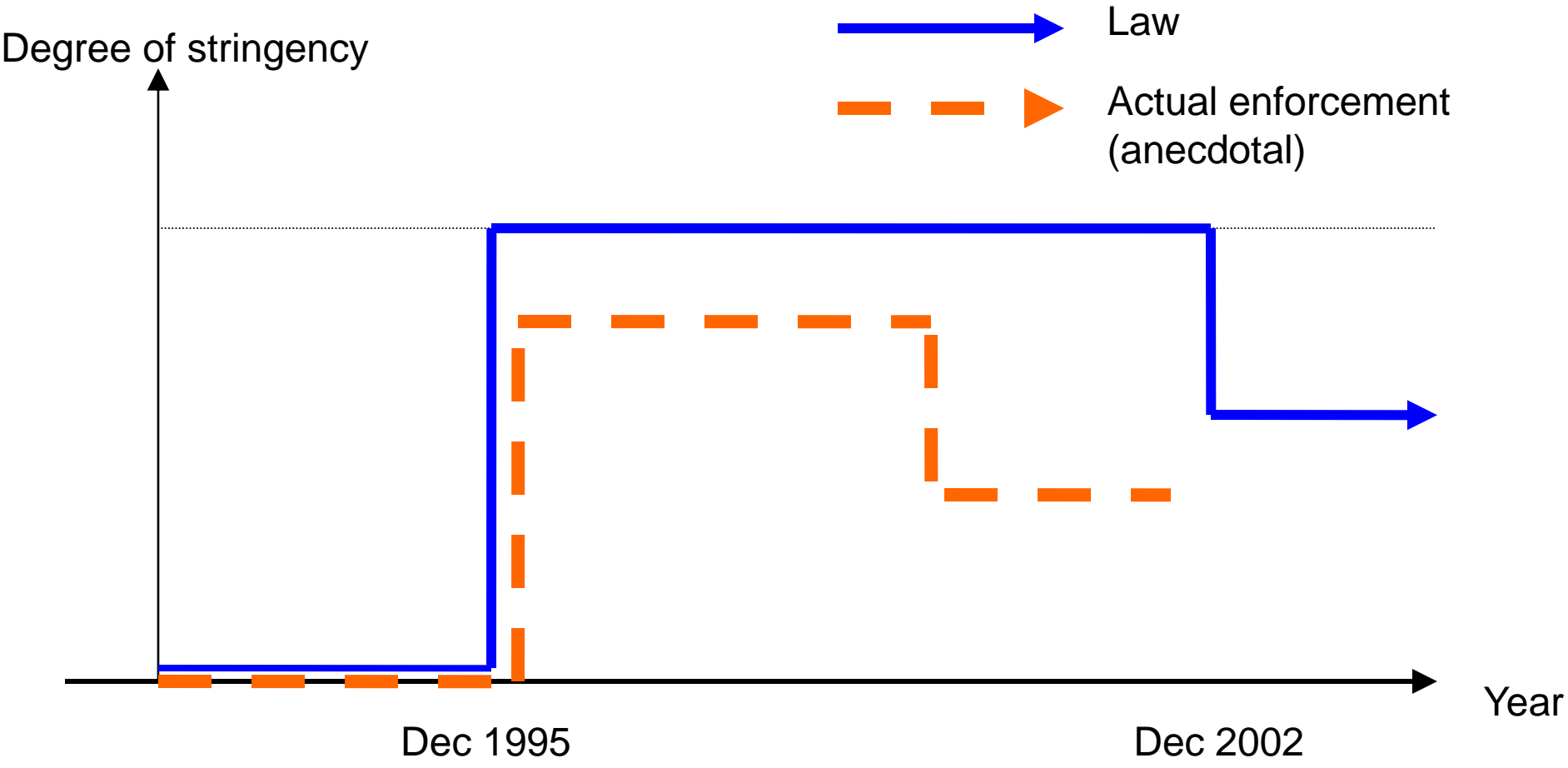
Ruling Party

PSOE (159/352)

PP (156/352)

PP (183/352)





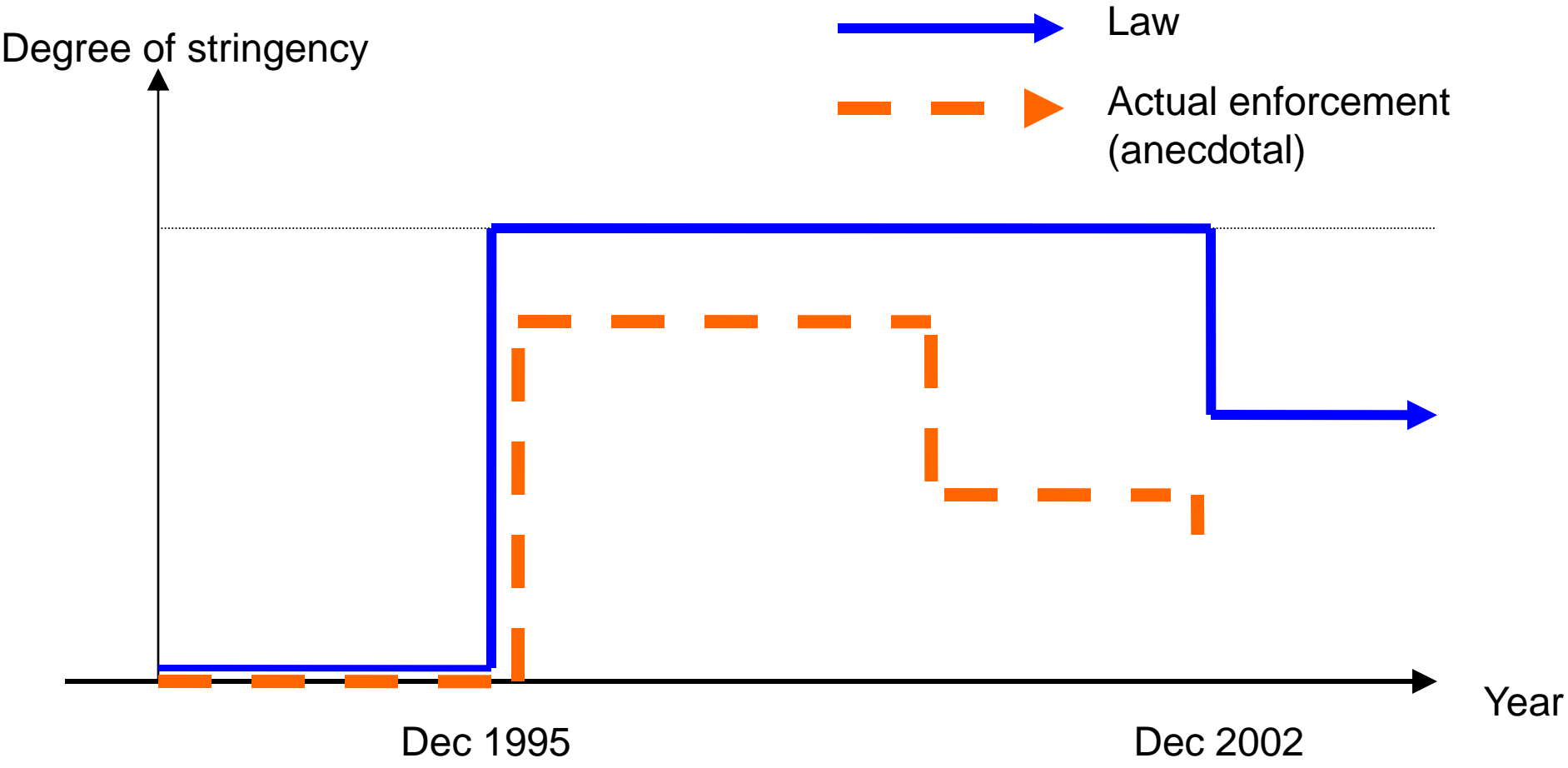
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Ruling Party

PSOE (159/352)

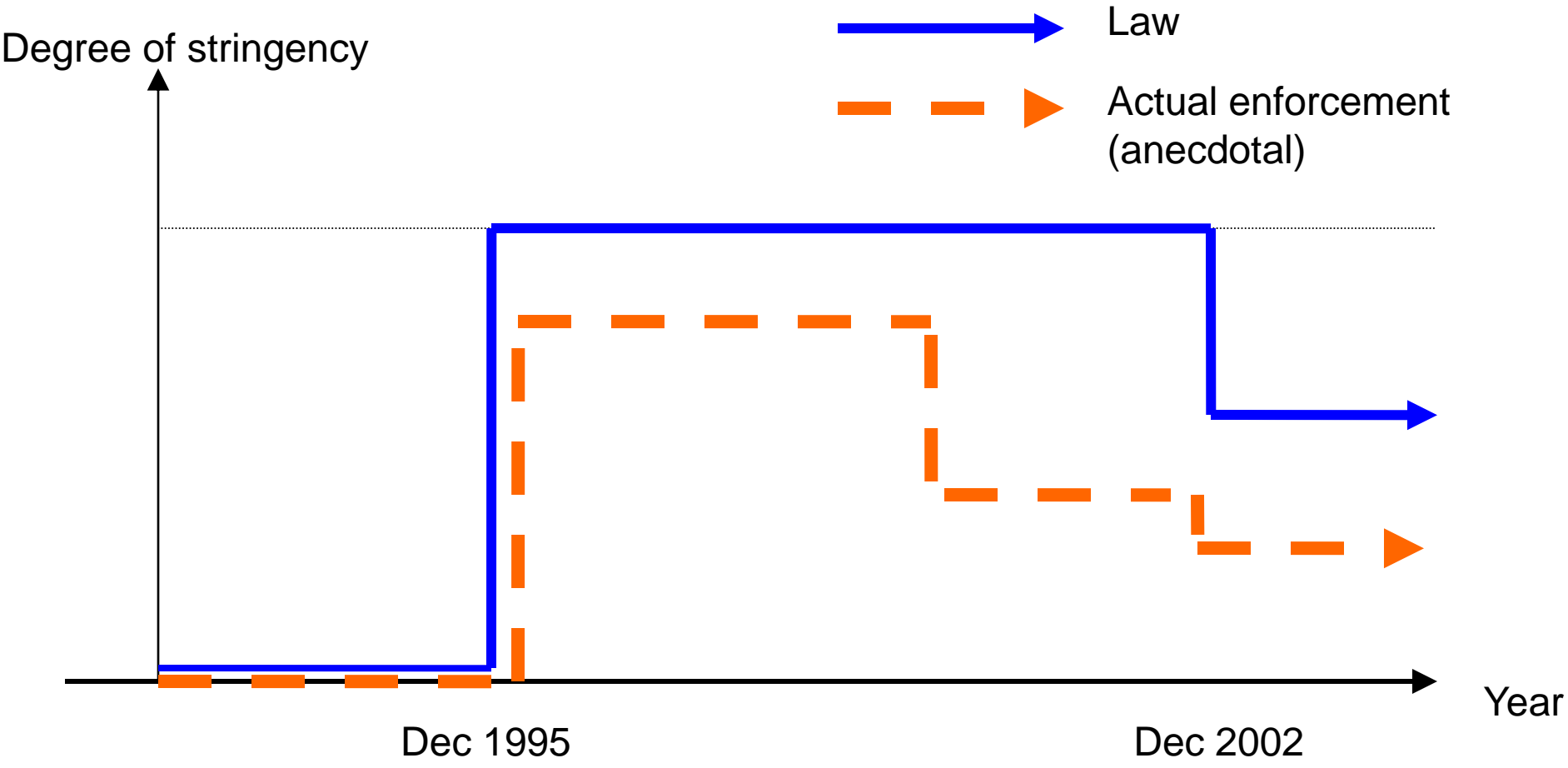
PP (156/352)

PP (183/352)



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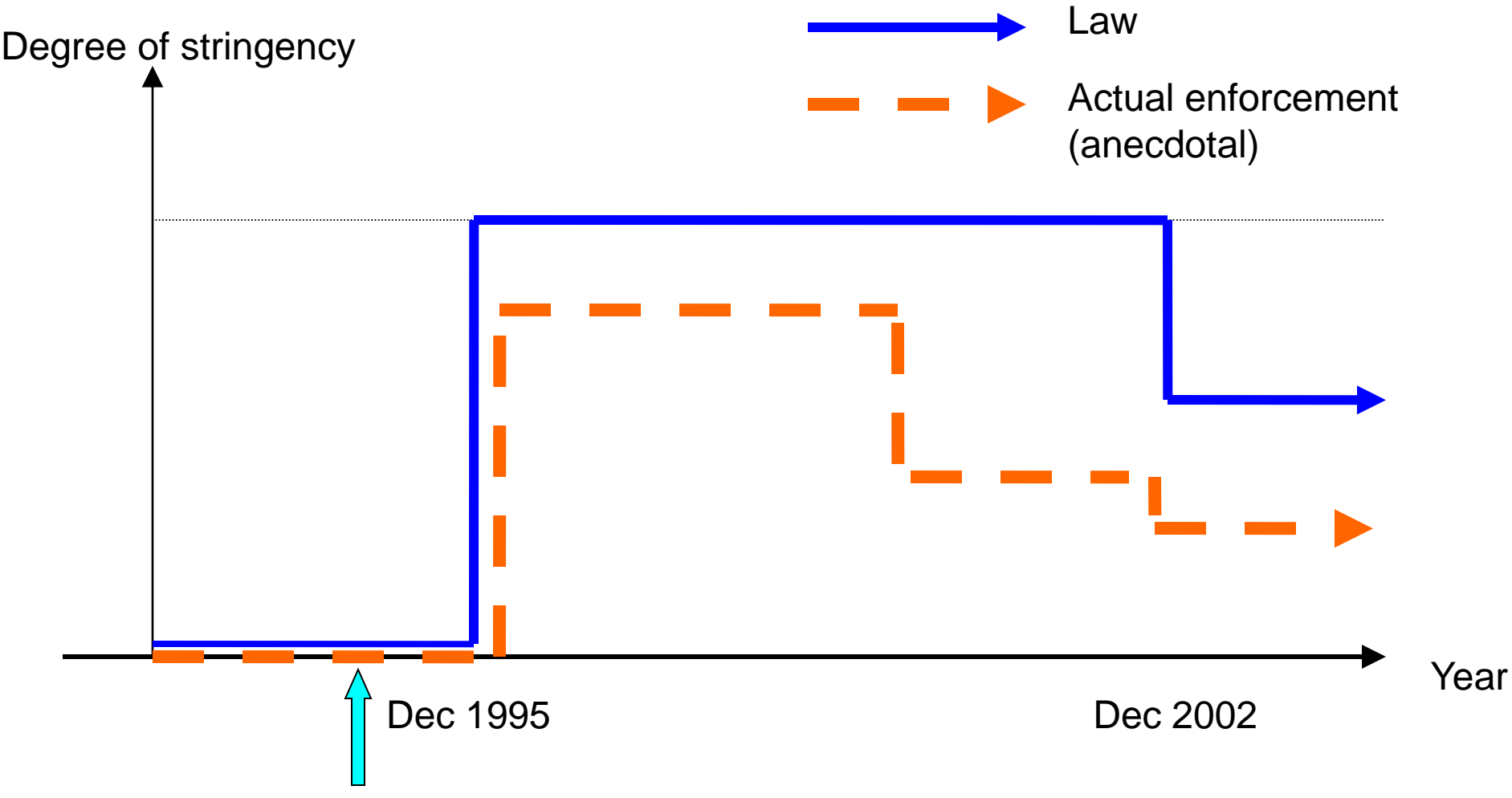
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Ruling Party

PSOE (159/352)

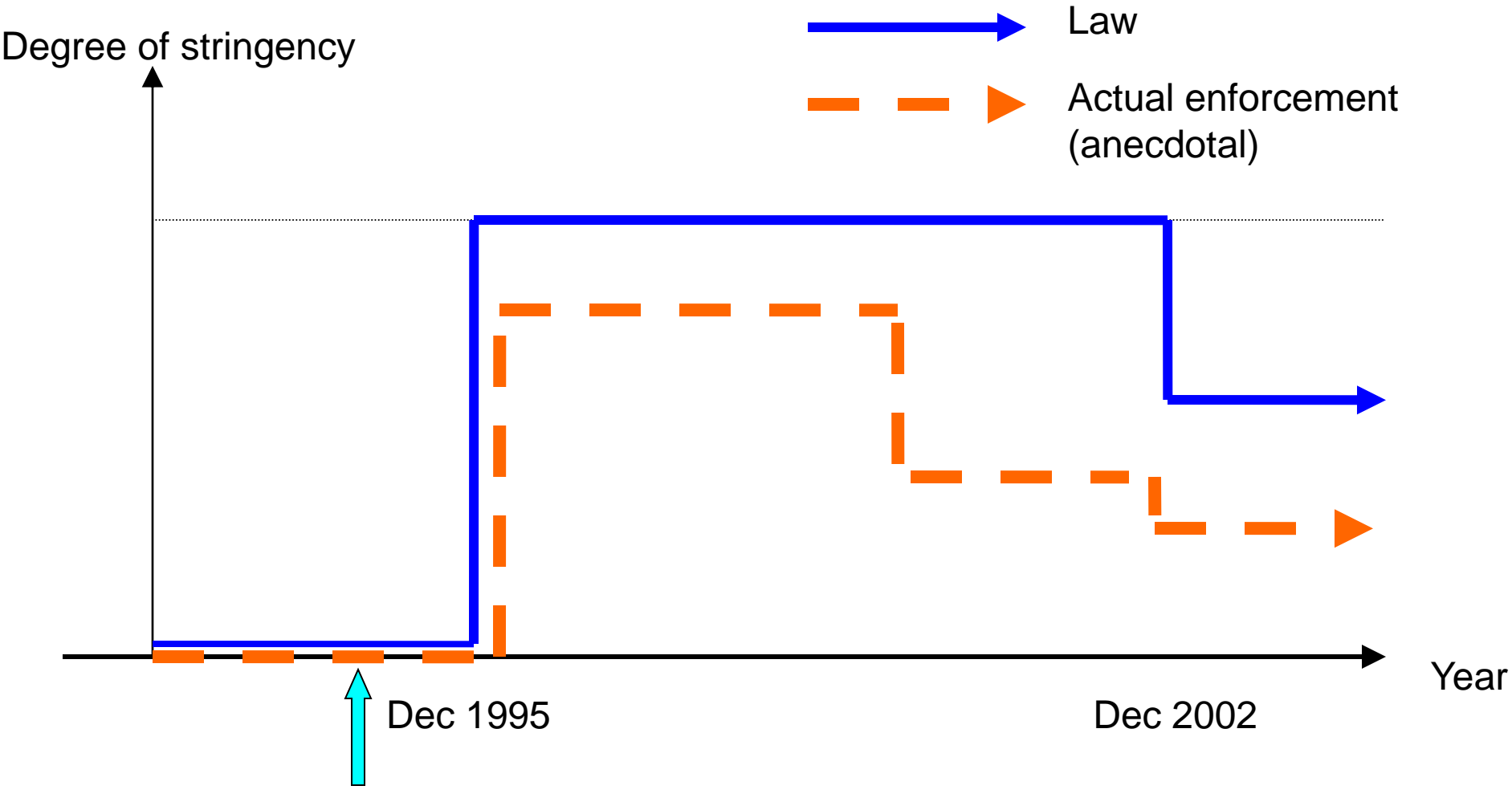
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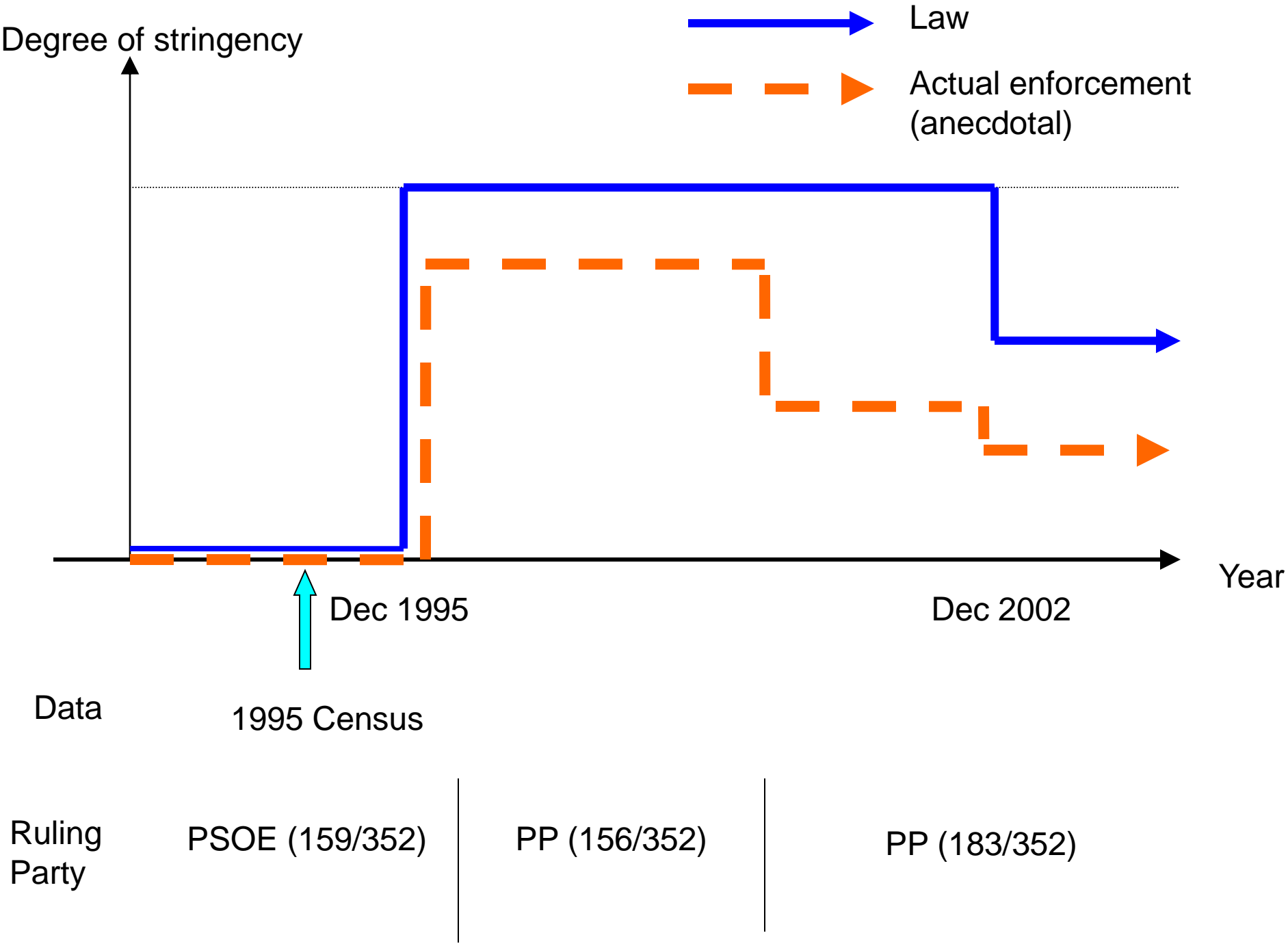
Ruling Party

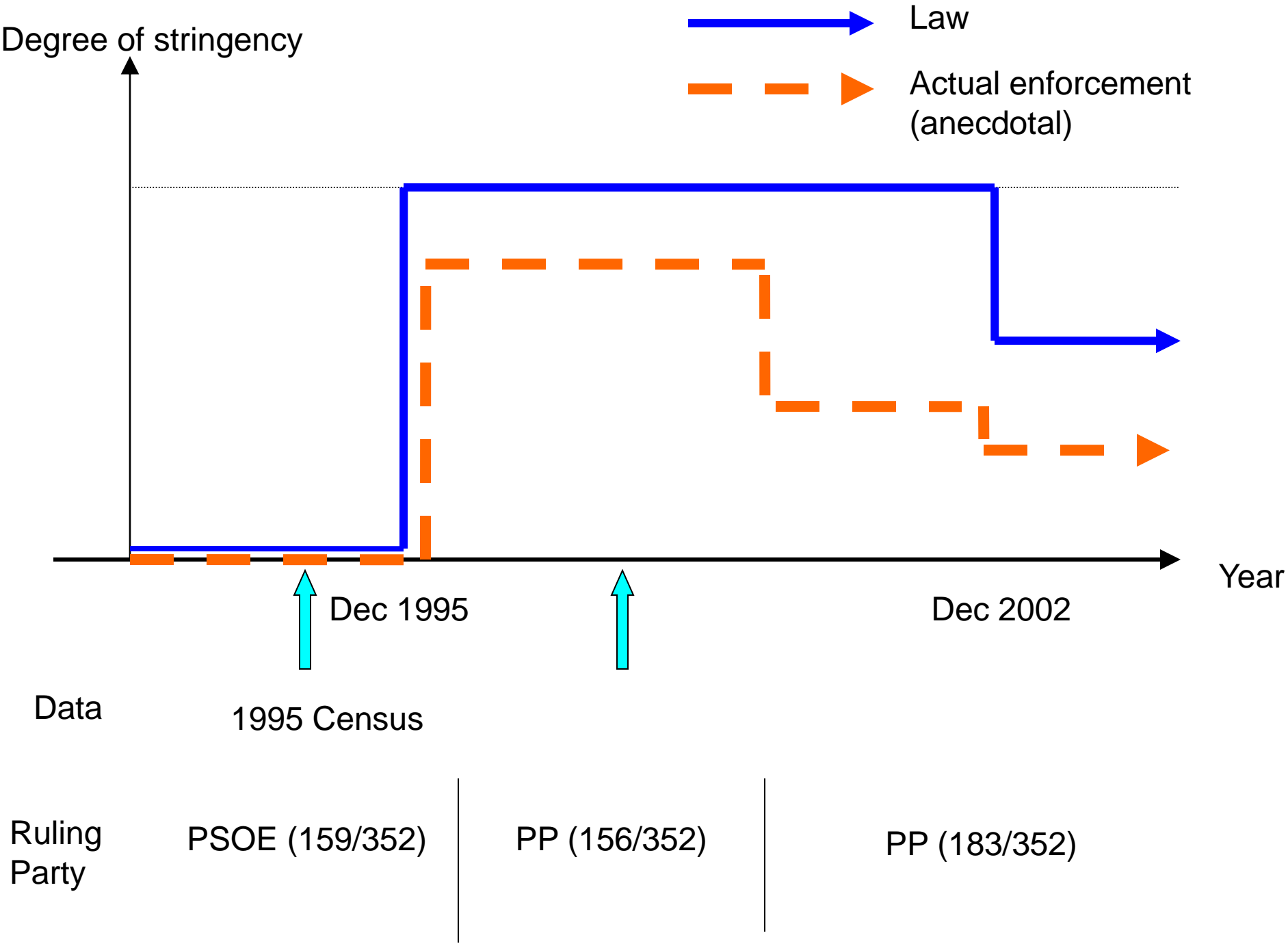
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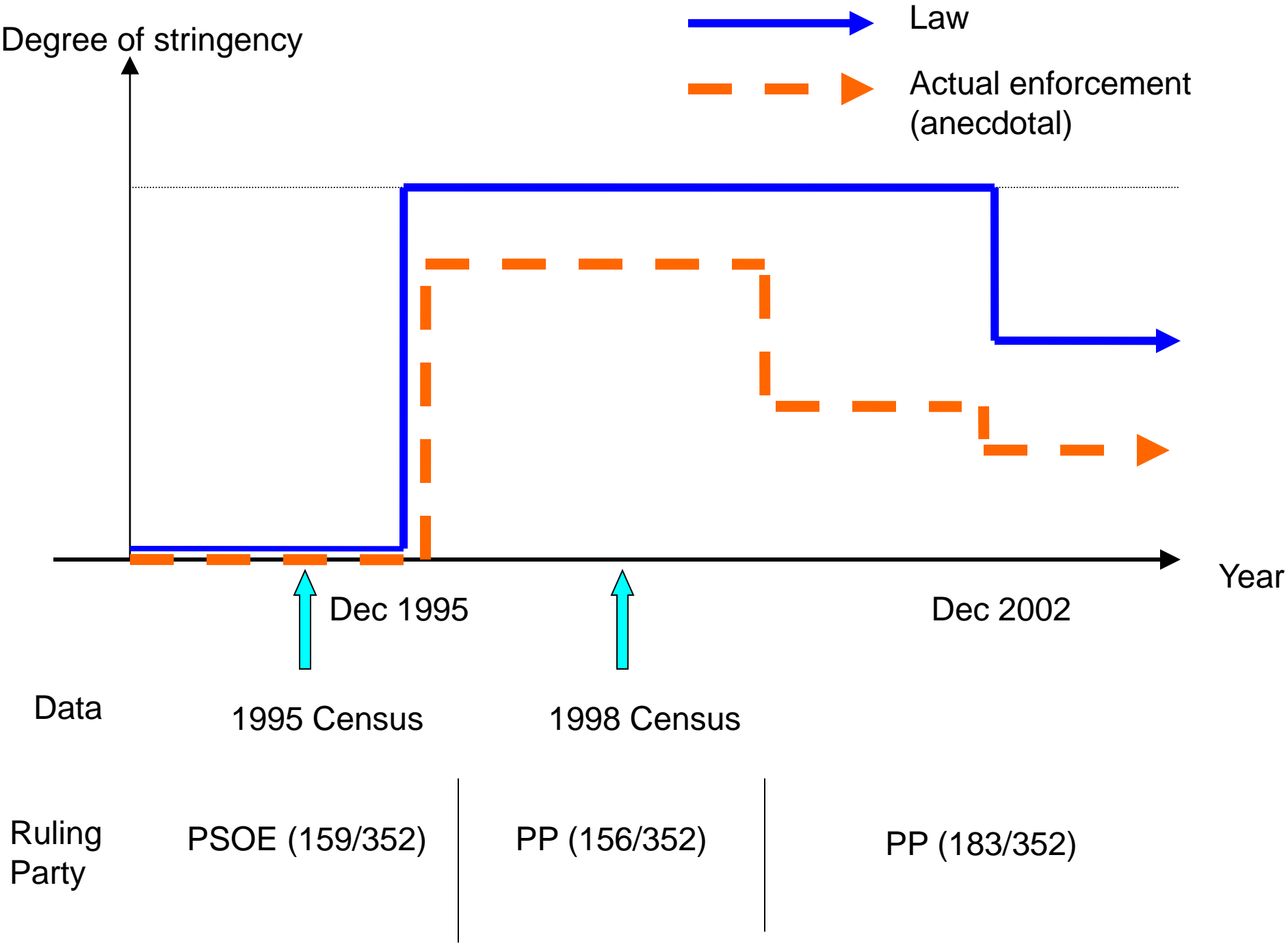


Ruling Party

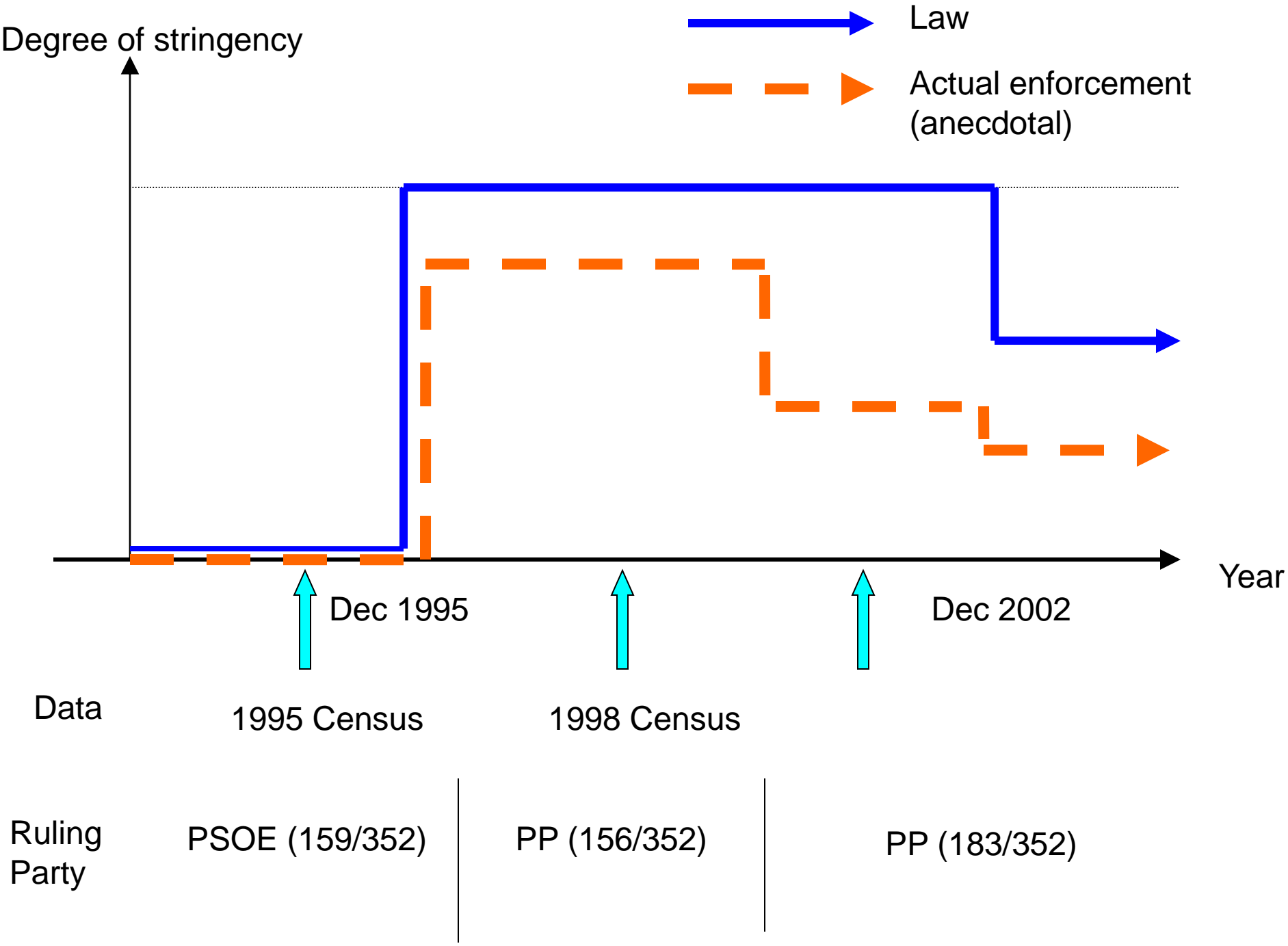
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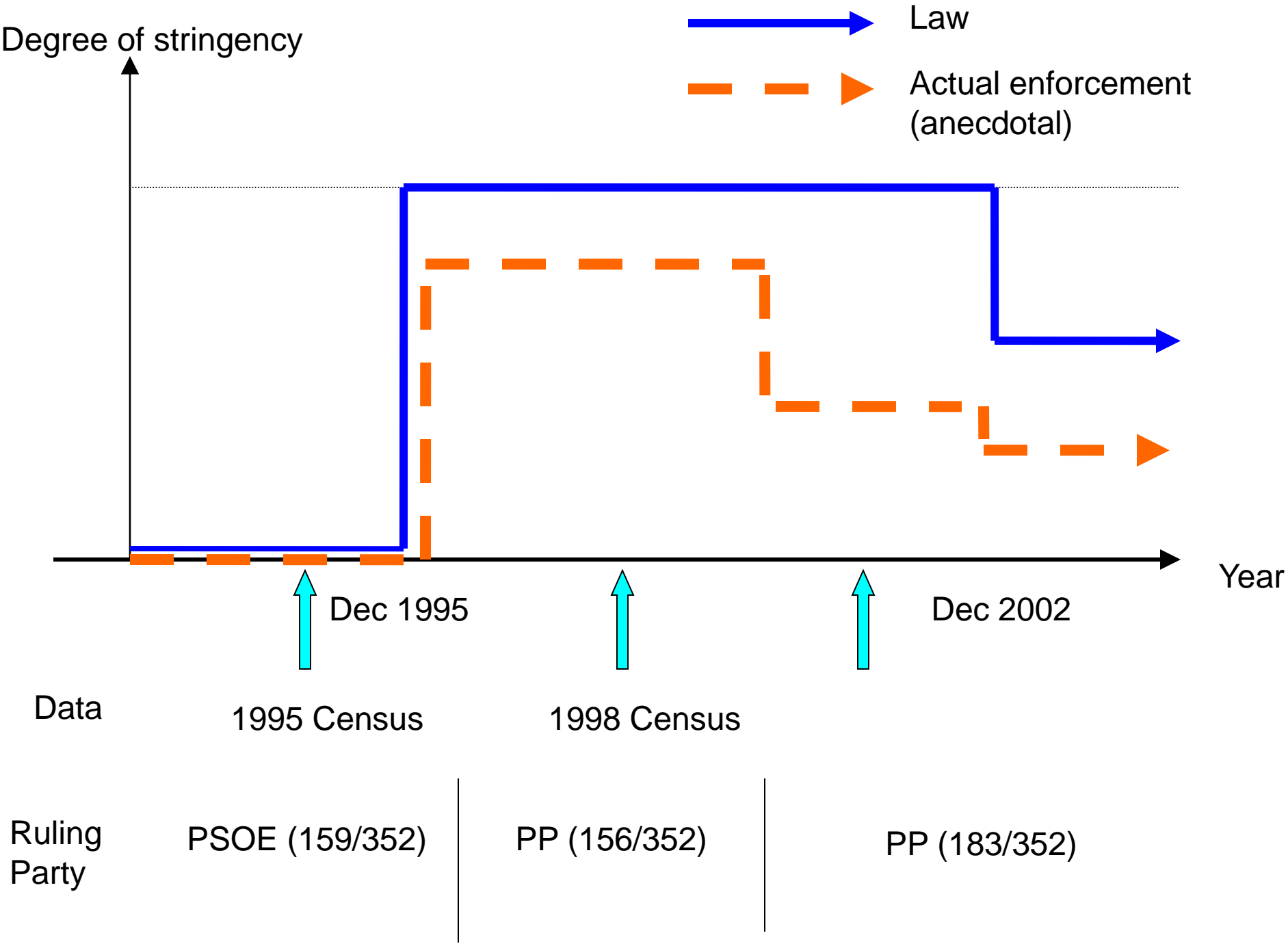


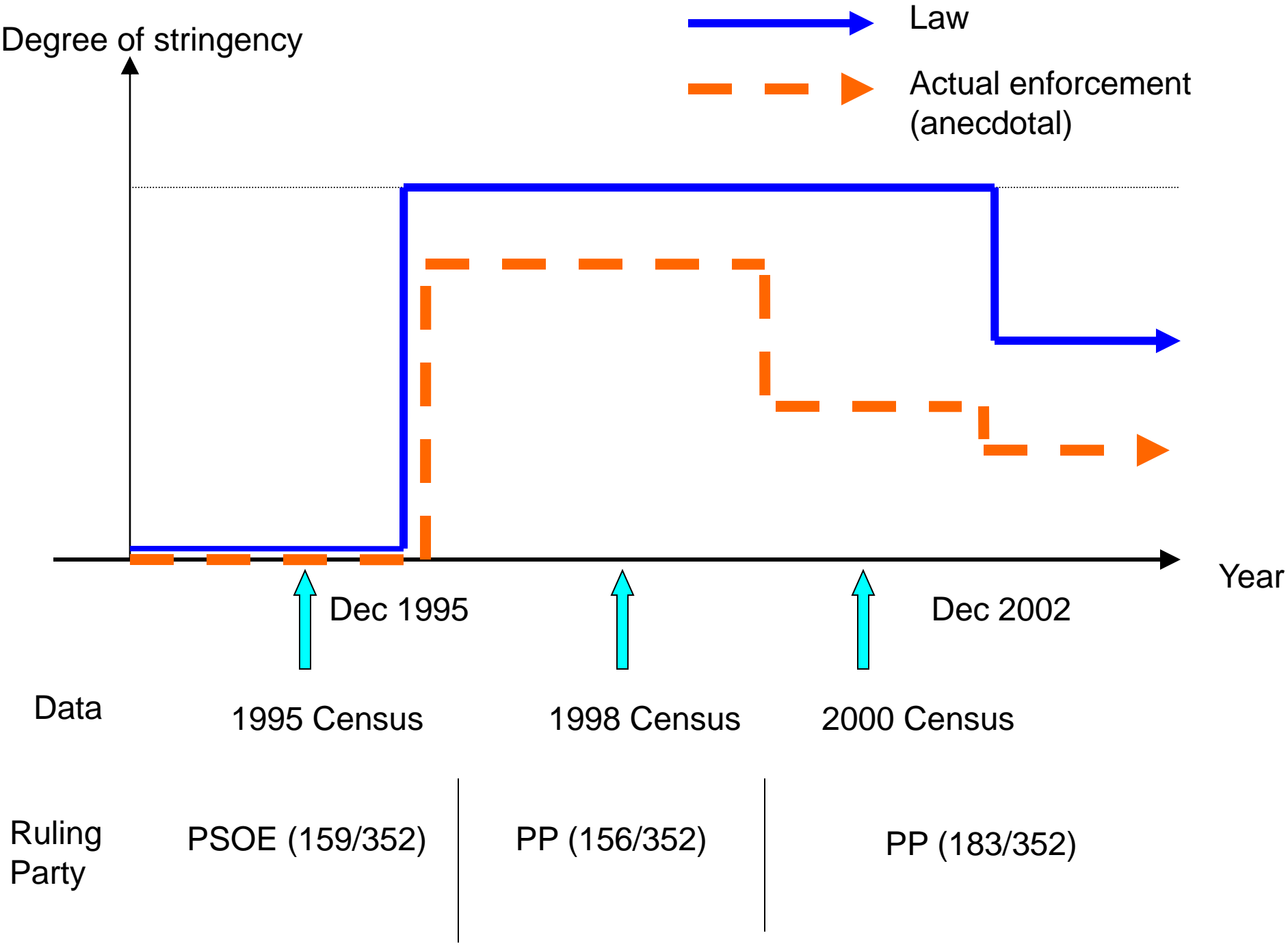












# Obvious Violations

| No Stations<br>per City 1995 | No Stations per City 1998 |     |    |    |   |    | Total |
|------------------------------|---------------------------|-----|----|----|---|----|-------|
|                              | 0                         | 1   | 2  | 3  | 4 | 5+ |       |
| 0                            | 2,506                     | 131 | 9  | 1  | 0 | 0  | 2,647 |
| 1                            | 153                       | 218 | 30 | 5  | 1 | 0  | 407   |
| 2                            | 8                         | 60  | 24 | 2  | 3 | 1  | 97    |
| 3                            | 1                         | 14  | 9  | 9  | 0 | 0  | 33    |
| 4                            | 0                         | 2   | 4  | 2  | 0 | 1  | 9     |
| 5+                           | 0                         | 2   | 2  | 2  | 5 | 4  | 15    |
| Total                        | 2,668                     | 427 | 78 | 21 | 9 | 6  | 3,209 |

# Data Source

- Local TV station census from AIMC (Asociación para la Investigación de Medios de Comunicación)
  - ▶ Census published in 1996, 1999, and 2002
  - ▶ Data collected during 1995, 1998, and 2001
  - ▶ Two parts: (1) Listing of all active local TV stations (881, 740 and 898 stations respectively)  
(2) Responses to questionnaire with station level information (183, 457 and 645 responses)
- Province GDP per capita from Spanish National Statistical Institute (INE)
- City level information from business activity and population census of "La Caixa"
- Electoral outcomes from municipal elections in May 1995 and June 1999

| Variable                        | 1996<br>Mean (Std. Dev.) | 1999<br>Mean (Std. Dev.) | 2002<br>Mean (Std. Dev.) | Min   | Max      |
|---------------------------------|--------------------------|--------------------------|--------------------------|-------|----------|
| No. Stations per City           | 0.269<br>(0.835)         | 0.228<br>(0.646)         | 0.275<br>(0.813)         | 0     | 17       |
| Monopoly?                       | 0.127<br>(0.333)         | 0.134<br>(0.341)         | 0.140<br>(0.347)         | 0     | 1        |
| Duopoly?                        | 0.030<br>(0.171)         | 0.025<br>(0.155)         | 0.026<br>(0.159)         | 0     | 1        |
| Triopoly?                       | 0.011<br>(0.102)         | 0.006<br>(0.079)         | 0.009<br>(0.096)         | 0     | 1        |
| Quadropoly?                     | 0.003<br>(0.053)         | 0.003<br>(0.053)         | 0.003<br>(0.056)         | 0     | 1        |
| Quintopoly?                     | 0.005<br>(0.068)         | 0.002<br>(0.043)         | 0.006<br>(0.079)         | 0     | 1        |
| City Population (000)           | 11.927<br>(66.869)       | 12.037<br>(66.903)       | 12.558<br>(69.394)       | 0.322 | 3016.788 |
| Unemployment Rate per City      | 5.117<br>(2.021)         | 3.347<br>(1.478)         | 3.196<br>(1.512)         | 0     | 25       |
| Cars per capita and City        | 0.332<br>(0.100)         | 0.362<br>(0.119)         | 0.408<br>(0.193)         | 0.042 | 7.079    |
| Bank Office per capita and City | 0.446<br>(0.459)         | 0.433<br>(0.443)         | 0.352<br>(0.366)         | 0     | 4.009    |
| Income per capita and Province  | 11.351<br>(2.563)        | 11.992<br>(2.744)        | 14.308<br>(3.040)        | 7.339 | 26.998   |
| PP Share                        | 0.311<br>(0.196)         | 0.329<br>(0.207)         | 0.329<br>(0.207)         | 0     | 0.989    |
| Province on the Coast?          | 0.557<br>(0.497)         | 0.557<br>(0.497)         | 0.557<br>(0.497)         | 0     | 1        |

# Empirical Model

- Profit function

$$\Pi_N = V_N * S(Y, \lambda) - F_N(W, \gamma) + u,$$

where  $S$ : city population, province population, population growth

- Per-capita variable profits

$$V_N = \alpha_1 + X\beta - \sum_{n=2}^N \alpha_n,$$

where  $X$ : unemployment rate, # of cars per person, # of bank offices per person, income per capita

- Fixed costs

$$F_N = \gamma_1 + W_L \gamma_L + \sum_{n=2}^N \gamma_n,$$

where  $W$ : coastal province, geographical area, PP share

# Estimation

- Probability of observing markets with no firms

$$\Pr(\Pi_1 < 0) = 1 - \Phi(\bar{\Pi}_1),$$

where  $\Phi(.)$  is cdf of  $u$  and  $\Pi_1 = \bar{\Pi}_1 + u$ .

- Assuming  $(\bar{\Pi}_1 \geq \bar{\Pi}_2 \geq \bar{\Pi}_3 \geq \dots)$ , probability of observing  $N$  in equilibrium

$$\Pr(\Pi_N \geq 0 \text{ and } \Pi_{N+1} < 0) = \Phi(\bar{\Pi}_N) - \Phi(\bar{\Pi}_{N+1}).$$



# Entry Threshold

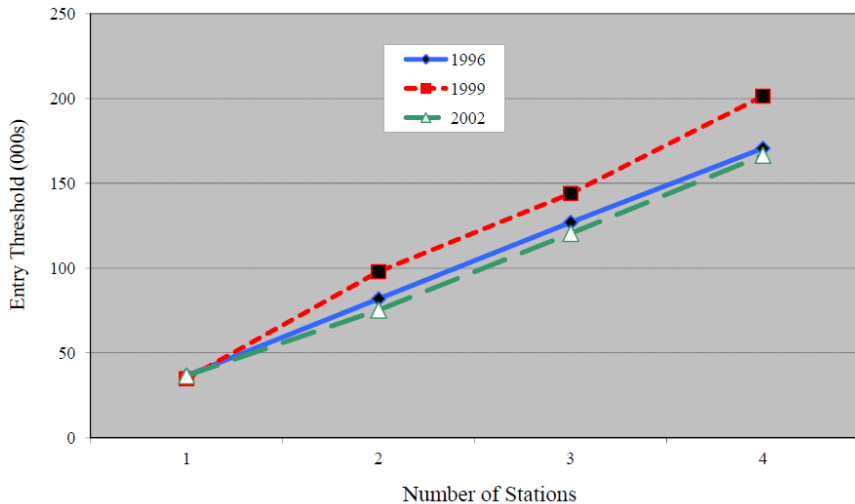
- Population entry threshold

$$\hat{S}_N = \frac{\hat{F}_N}{\hat{V}_N} = \frac{\hat{\gamma}_1 + \overline{W}\hat{\gamma}_L + \sum_{n=2}^N \hat{\gamma}_n}{\hat{\alpha}_1 + \overline{X}\hat{\beta} - \sum_{n=2}^N \hat{\alpha}_n}$$

| Variables                                  | 1995                   | 1998                    | 2001                     |
|--|------------------------|-------------------------|--------------------------|
| province population ( $\lambda_1$ )        | 0.000928<br>(0.000688) | 0.000213<br>(0.000687)  | 0.000819**<br>(0.000363) |
| city population growth ( $\lambda_2$ )     | 0.00173<br>(0.00212)   | 0.000210<br>(0.000663)  | 0.00115<br>(0.000749)    |
| province population growth ( $\lambda_3$ ) | 0.0436***<br>(0.0125)  | 0.00641***<br>(0.00230) | 0.00514**<br>(0.00205)   |
| $\beta$ unemployment                       | -30.49***<br>(6.548)   | -47.64***<br>(7.661)    | -43.57***<br>(5.758)     |
| $\beta$ cars                               | -66.45<br>(141.4)      | 146.1<br>(136.4)        | -81.10<br>(85.38)        |
| $\beta$ banks                              | -112.9*<br>(62.87)     | -69.37<br>(61.14)       | 72.56<br>(55.84)         |
| $\beta$ income                             | -17.13***<br>(3.415)   | -31.91***<br>(3.802)    | -33.02***<br>(2.708)     |
| $\alpha_1$                                 | 870.2***<br>(97.28)    | 968.9***<br>(97.84)     | 1,048***<br>(63.23)      |
| $\alpha_2$                                 | 155.0***<br>(27.15)    | 200.8***<br>(25.83)     | 72.58***<br>(24.47)      |
| $\alpha_3$                                 | 67.21***<br>(19.05)    | 33.89*<br>(19.95)       | 96.24***<br>(23.60)      |
| $\alpha_4$                                 | 26.01<br>(22.12)       | 37.00<br>(28.92)        | 46.27*<br>(25.22)        |
| $\alpha_5$                                 | 19.65<br>(23.89)       | 53.54**<br>(26.87)      | 14.18<br>(21.48)         |
| $\alpha_6$                                 |                        | 25.56<br>(44.21)        |                          |

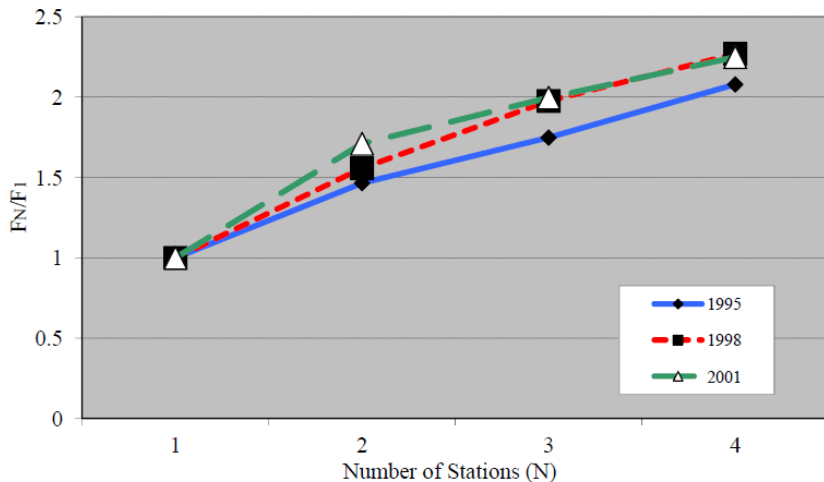
| Variables                | 1995                  | 1998                  | 2001                  |
|--------------------------|-----------------------|-----------------------|-----------------------|
| $\gamma 1$               | 2.385***<br>(0.160)   | 2.234***<br>(0.156)   | 2.367***<br>(0.139)   |
| $\gamma 2$               | 0.749***<br>(0.0700)  | 0.867***<br>(0.0722)  | 1.104***<br>(0.0766)  |
| $\gamma 3$               | 0.456***<br>(0.0953)  | 0.651***<br>(0.129)   | 0.445***<br>(0.124)   |
| $\gamma 4$               | 0.533***<br>(0.187)   | 0.455*<br>(0.248)     | 0.392**<br>(0.197)    |
| $\gamma 5$               | 0.360<br>(0.256)      | 0.141<br>(0.243)      | 0.325<br>(0.280)      |
| $\gamma 6$               | 0.272<br>(0.186)      | 0.205<br>(0.510)      | 1.025***<br>(0.387)   |
| $\gamma pps\text{share}$ |                       |                       |                       |
| $\gamma \text{coast}$    | -0.378***<br>(0.0731) | -0.317***<br>(0.0699) | -0.315***<br>(0.0651) |
| $\gamma 1\text{km}2$     | -0.165***<br>(0.0287) | -0.187***<br>(0.0292) | -0.220***<br>(0.0268) |
| Number of Observations   | 3,036                 | 3,117                 | 3,137                 |
| Log likelihood           | -1462                 | -1359                 | -1455                 |

## Entry Threshold Estimates (SN)

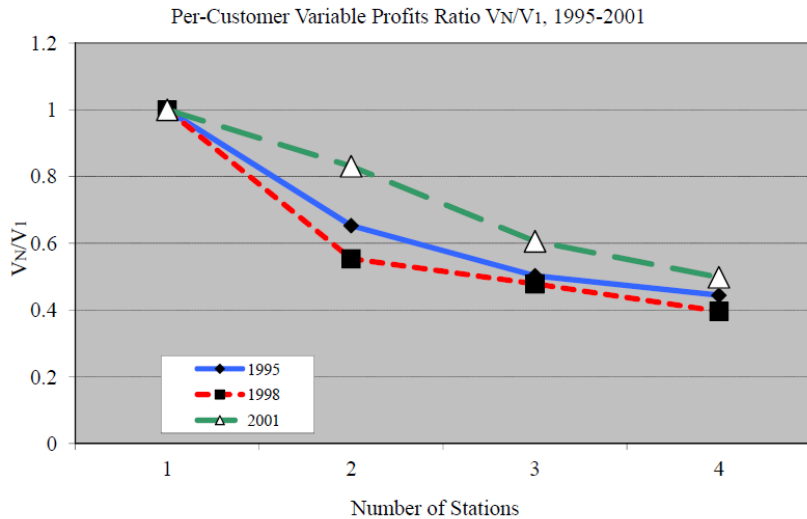


$$S_n = F_n/V_n$$

Fixed Costs Ratio  $F_N/F_1$ , 1995-2001



$$S_n = F_n/V_n$$



## Several Caveats Remaining:

- We treat “public” and private interchangeably. In reality, ...
- It is not dynamic model. Are these snap shots steady state of the economy for the industry?
- Market definition: Are these cities really isolated?
- Strong assumptions on which demographics variables affect demand or costs

# Conclusion

- How does policy enforcement affect firm behavior?
- We estimate entry thresholds across years and decompose them
- Findings
  - ▶ (1) Fixed costs are affected in 1998 and 2001
  - ▶ (2) Variable profits are affected in 2001
- Even a simple model can be informative about (1) how strongly the government enforces a policy and (2) the nature of regulation enforcement
- The approach is useful for public policies of which enforcement and effect on the competition of firms are not obvious



# Appendix

# Spanish TV Industry

- Main source of revenue: advertising
- History:
  - ▶ Prior to 1980s, National Government-Owned: TVE and TVE2
  - ▶ Early 1980s, Regional: At most two per region
  - ▶ Mid 1980s, Municipals (= cities): local stations
  - ▶ Late 1980s, National Privately-Run: Antena3, Tele5, Canal+

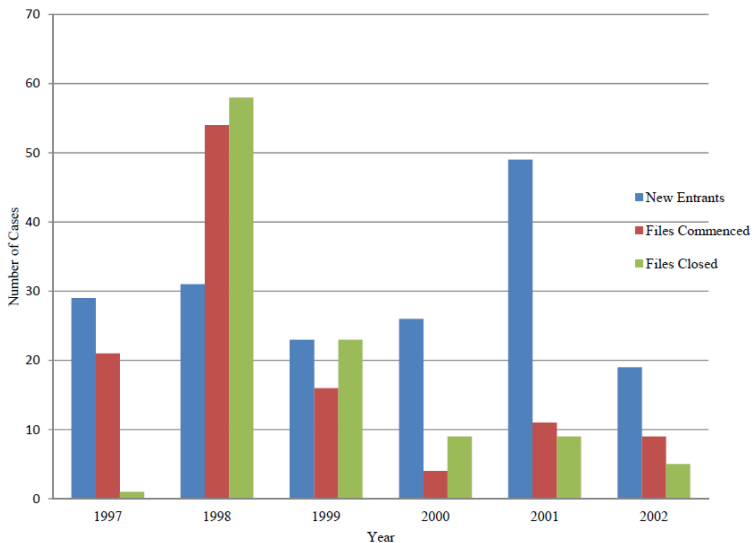
# Two Major Political Parties

- PSOE (Partido Socialista Obrero Español): left-wing party, the industry needs to be regulated
- PP (Partido Popular): right-wing party, the industry needs to be de-/unregulated
- Timeline
  - ▶ Before 1996: PSOE
  - ▶ 1996 election: PP with little support in congress (156 out of the 350 seats)
  - ▶ "Silent" deregulation accelerates in 2000 after general election results (Badillo, 2003)  
Chose not fully enforce the law. The enforcement of the law is laxer especially in cities ruled by PP officials.
  - ▶ 2000 election: PP with full support at congress (183 seats)

# Station Ownership by PP or PSOE City Ruling Government

| Variable                 | Obs | Mean | Std. Dev. | Max<br>Votes PP?<br>= 1 | Max<br>Votes PP?<br>= 0 | Max<br>Votes<br>PSOE? = 1 | Max<br>Votes<br>PSOE? = 0 |
|--------------------------|-----|------|-----------|-------------------------|-------------------------|---------------------------|---------------------------|
| <b>Year 2001</b>         |     |      |           |                         |                         |                           |                           |
| <b>Private Property?</b> | 632 | 0.80 | 0.40      | 0.90<br>(0.02)          | 0.72<br>(0.02)          | 0.76<br>(0.03)            | 0.83<br>(0.02)            |
| <b>Max Votes PP?</b>     | 632 | 0.46 | 0.50      |                         |                         |                           |                           |
| <b>Max Votes PSOE?</b>   | 632 | 0.33 | 0.47      |                         |                         |                           |                           |

# Station Entry vs. Regulatory Activity 1997 to 2002



# Number of Stations in 1998 and 2001

| No Stations<br>per City 1998 | No Stations per City 2001 |     |    |    |    |    | Total |
|------------------------------|---------------------------|-----|----|----|----|----|-------|
|                              | 0                         | 1   | 2  | 3  | 4  | 5+ |       |
| 0                            | 2,571                     | 93  | 4  | 0  | 0  | 0  | 2,668 |
| 1                            | 48                        | 328 | 36 | 11 | 2  | 2  | 427   |
| 2                            | 3                         | 22  | 35 | 11 | 4  | 3  | 78    |
| 3                            | 1                         | 0   | 7  | 6  | 3  | 4  | 21    |
| 4                            | 0                         | 0   | 1  | 1  | 2  | 5  | 9     |
| 5+                           | 0                         | 0   | 0  | 0  | 0  | 6  | 6     |
| Total                        | 2,623                     | 443 | 83 | 29 | 11 | 20 | 3,209 |

# Violations by Year and Political Parties

| <b>%<br/>Violations<br/>per Year</b> | <b>Cities<br/>Ruled by<br/>PP</b> | <b>Cities<br/>Ruled by<br/>PSOE</b> |
|--------------------------------------|-----------------------------------|-------------------------------------|
| <b>1995</b>                          | 18%                               | 7%                                  |
| <b>1998</b>                          | 15%                               | 4%                                  |
| <b>2001</b>                          | 27%                               | 26%                                 |

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Note: A violation here is more than two TV stations per city

| Variables                                  | 1995                     | 1998                   | 2001                    |
|--|--------------------------|------------------------|-------------------------|
| province population ( $\lambda_1$ )        | 0.00181***<br>(0.000695) | 0.000756<br>(0.000716) | 0.000759<br>(0.000790)  |
| city population growth ( $\lambda_2$ )     | 0.00110<br>(0.00211)     | 0.000243<br>(0.000627) | 0.000954<br>(0.000662)  |
| province population growth ( $\lambda_3$ ) | 0.0531***<br>(0.0127)    | 0.0104***<br>(0.00272) | 0.00553***<br>(0.00213) |
| $\beta$ ppshare                            | -47.67<br>(79.74)        | 70.93<br>(83.25)       | 224.5***<br>(77.62)     |
| $\beta$ coast                              | -47.79**<br>(23.72)      | -26.59<br>(26.55)      | -88.10***<br>(24.95)    |
| $\beta$ 1km2                               | -4.881<br>(9.849)        | -4.626<br>(9.735)      | -36.84***<br>(9.887)    |
| $\beta$ unemployment                       | -48.71***<br>(7.201)     | -62.55***<br>(8.498)   | -64.24***<br>(7.958)    |
| $\beta$ cars                               | -124.8<br>(186.9)        | 343.2**<br>(170.0)     | 38.75<br>(124.1)        |
| $\beta$ banks                              | -115.2<br>(70.20)        | -90.43<br>(69.13)      | 23.83<br>(71.48)        |
| $\beta$ income                             | -19.24***<br>(5.371)     | -33.30***<br>(5.602)   | -45.79***<br>(4.949)    |
| $\alpha_1$                                 | 1.083***<br>(141.9)      | 972.9***<br>(154.1)    | 1.417***<br>(152.6)     |
| $\alpha_2$                                 | 128.6***<br>(27.05)      | 172.1***<br>(26.40)    | 33.35<br>(24.27)        |
| $\alpha_3$                                 | 64.74***<br>(19.13)      | 36.10*<br>(20.76)      | 84.39***<br>(24.64)     |
| $\alpha_4$                                 | 24.62<br>(22.86)         | 40.72<br>(30.84)       | 70.77**<br>(30.50)      |
| $\alpha_5$                                 | 15.85<br>(23.04)         | 53.97*<br>(28.56)      | 15.85<br>(24.81)        |
| $\alpha_6$                                 |                          | 21.23<br>(12.80)       |                         |



| Variables              | 1995                   | 1998                  | 2001                   |
|------------------------|------------------------|-----------------------|------------------------|
| $\gamma 1$             | 2.759***<br>(0.361)    | 2.477***<br>(0.347)   | 3.084***<br>(0.363)    |
| $\gamma 2$             | 0.791***<br>(0.0740)   | 0.889***<br>(0.0763)  | 1.207***<br>(0.0802)   |
| $\gamma 3$             | 0.471***<br>(0.101)    | 0.652***<br>(0.137)   | 0.529***<br>(0.136)    |
| $\gamma 4$             | 0.552***<br>(0.197)    | 0.431<br>(0.263)      | 0.373*<br>(0.222)      |
| $\gamma 5$             | 0.385<br>(0.268)       | 0.126<br>(0.242)      | 0.388<br>(0.328)       |
| $\gamma 6$             | 0.269<br>(0.184)       | 0.238<br>(0.530)      | 1.031***<br>(0.381)    |
| $\gamma$ ppshare       | 0.439**<br>(0.222)     | 0.987***<br>(0.213)   | 1.121***<br>(0.200)    |
| $\gamma$ coast         | -0.422***<br>(0.0867)  | -0.360***<br>(0.0848) | -0.481***<br>(0.0787)  |
| $\gamma$ lkm2          | -0.163***<br>(0.0374)  | -0.185***<br>(0.0359) | -0.279***<br>(0.0364)  |
| $\gamma$ unemployment  | -0.0964***<br>(0.0202) | -0.119***<br>(0.0261) | -0.0872***<br>(0.0259) |
| $\gamma$ cars          | -0.639<br>(0.479)      | 0.731<br>(0.482)      | 0.374<br>(0.379)       |
| $\gamma$ banks         | -0.148<br>(0.106)      | -0.158<br>(0.1000)    | 0.0110<br>(0.116)      |
| $\gamma$ income        | 0.0425**<br>(0.0193)   | -0.00127<br>(0.0178)  | -0.0244*<br>(0.0148)   |
| Number of Observations | 3,036                  | 3,117                 | 3,137                  |
| Log likelihood         | -1440                  | -1344                 | -1430                  |

# New Entry of Local TV Stations

