

# Contracting for Resilient Infrastructures

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*Very Preliminary. Please do not cite*

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# Presentation Outline

- I. Infrastructures: A Typology
- II. Contracting for Infrastructure
- III. France as a Natural Experiment

# I. Infrastructures: A Typology

- **Standalone physical infrastructures**

- Construction and manufacturing firms
- Dams and reservoirs
- Mining firms
- Public administration and utilities
- Trade and services firms

- **Transportation infrastructures**

- Railways, roads, skyways and waterways
- Airports, ports and railway stations
- E-lines and pipelines

- **Digital infrastructures**

- Data collection, processing, transfer and storing
- Digital networks

- **Social infrastructures**

- Human capital and unions
- Social networks

# II. Contracting for Infrastructures

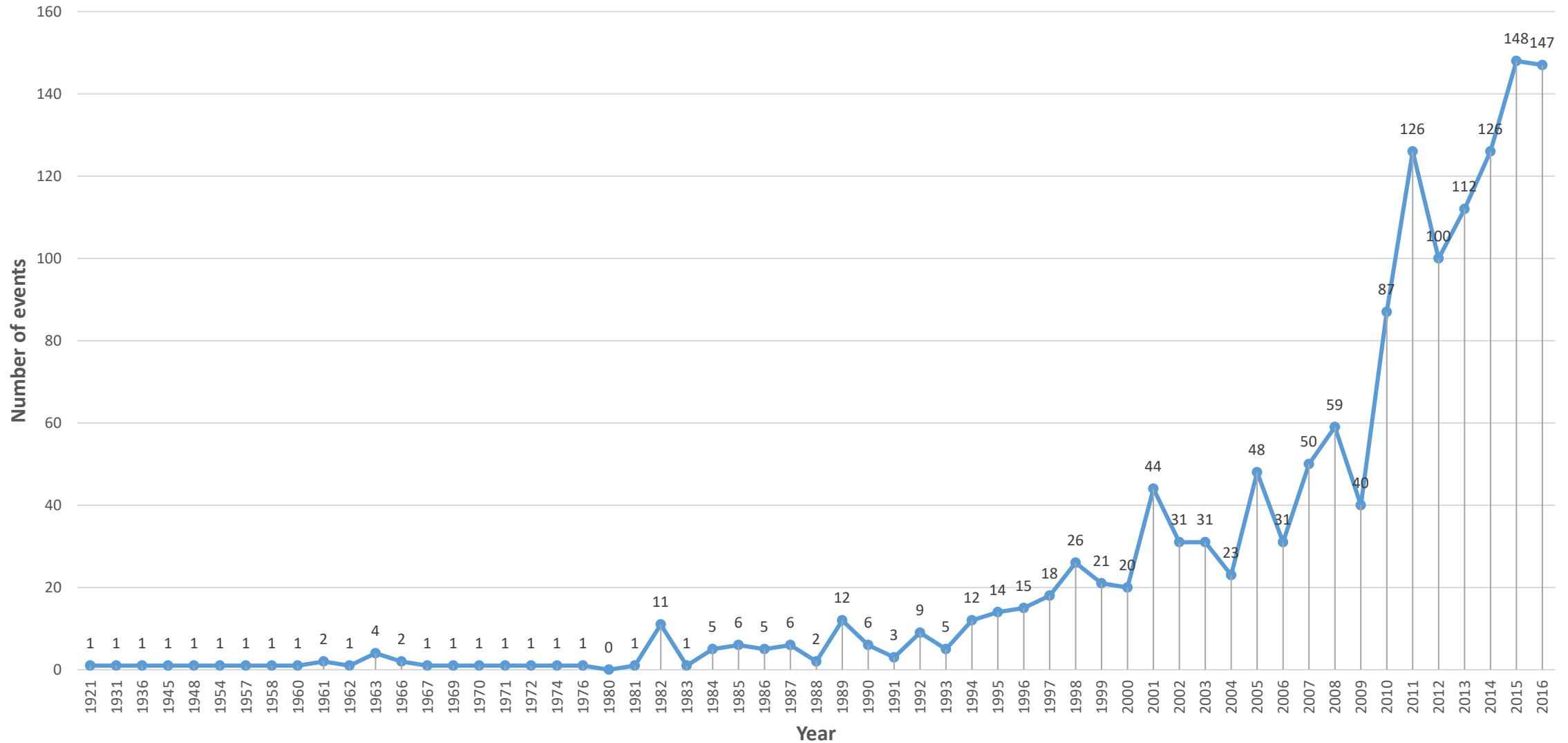
- **Bundling infrastructure design, construction and operation**
- **Delegating public services to providers**
  - Payments according to **performance** → No demand risk for provider (France since 2004)
  - Payment depends on **actual use** → Demand risk on provider (traditional approach)
- **Incomplete contract theory** (Hermalin, Katz & Craswell 2006; Athias & Soubeyran 2012)
  - Contracts cannot take into account all the relevant variables
    - Infrastructure contracts are **complex long-term** projects
    - Provider performance and drivers of demand are both **hard to assess**
  - Rule of thumb
    - High benefits of **adaptation**: No demand risk on provider
    - High benefits of **cost reductions**: Demand risk on provider
  - Renegotiation clauses and pre-contractual commitment (Laffont & Tirole 1988; Engel & Galetovic 2009)

# Taking into Account Resistance Factors

- **The concept of resistance**
  - Ability to withstand high-magnitude/low probability disruptions
  - Preventive measures are harder to adopt or implement
- **Identifying disruptions**
  - Disruptive events
  - Infrastructure fatigue or neglect
- **Reporting disruptions**
  - Managerial and owner disincentives
  - High magnitude events are hard to conceal
  - Role of media and social networks

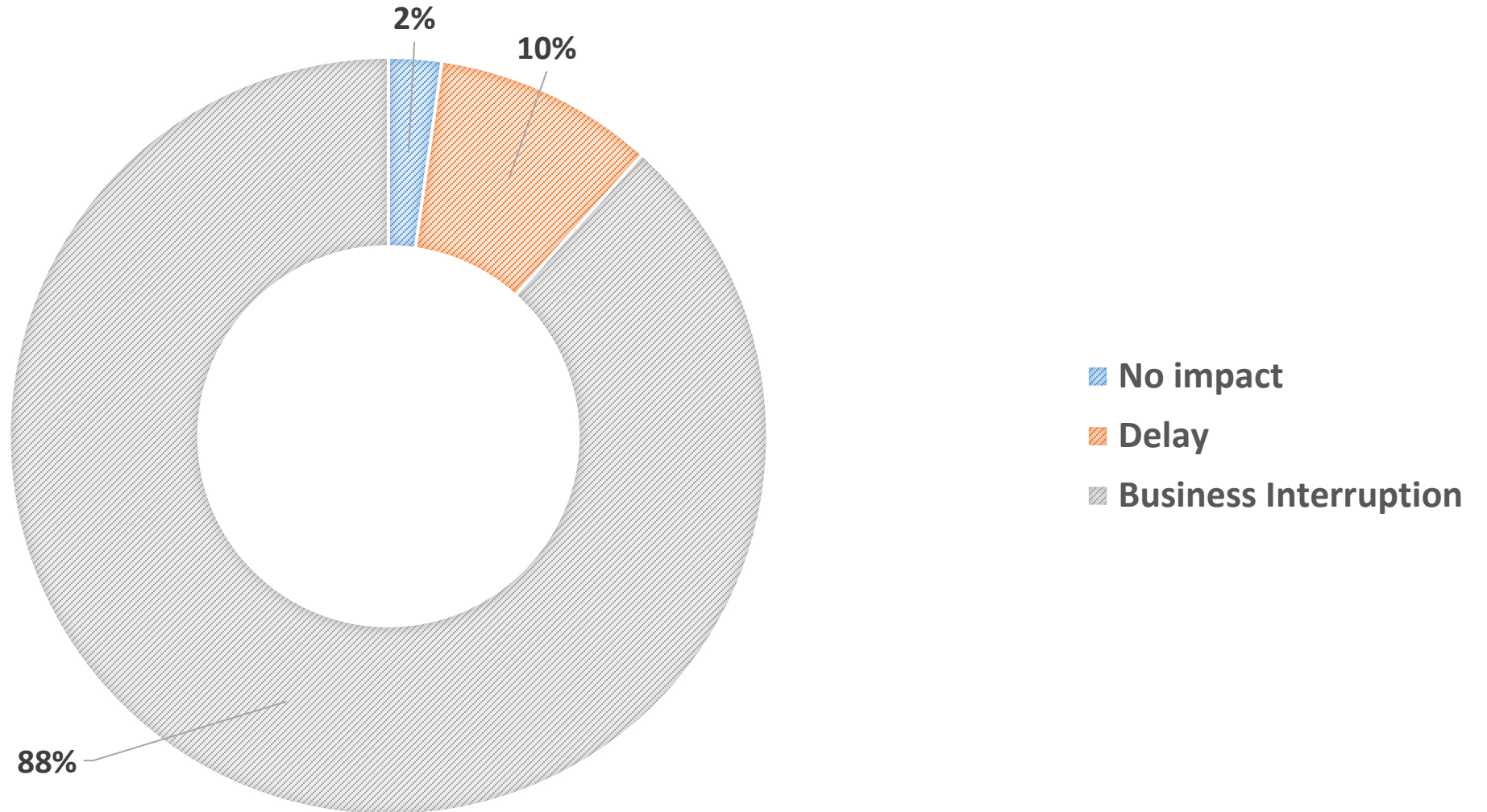
# DISRUPTIVE EVENTS : PROBABILITY & DISCLOSURE

## Preliminary & Incomplete Identification by Layla Khoja (London Listed Firms)



# IMPACT OF DISRUPTIVE EVENTS

(BASED ON 1414 EVENTS IDENTIFIED BY LAYLA KHOJA)



# Integrating Resilience Considerations

- **The concept of resilience**
  - Capability to **recover, adapt and learn**
  - When disruptive events occur
- **Dealing *ex ante* with resilience issues**
  - Contract governance: Unilateral actions vs cooperation
  - Risk allocation: Risk aversion and getting the investment surplus
  - Doctrinal approach: Frustration exception and force majeure clauses
- **Contractual flexibility as an adaptation and learning option**
  - Introducing re-negotiation clauses
  - Providing for *ex post* third party intervention



# III. France as a Natural Experiment

- **Regulatory and privatization events in early 2000**
  - Pay for performance (adaptation) as an alternative to pay for actual use (cost reduction) (2004)
  - Introducing PPP
- **Parties to infrastructure contracts**
  - State & State pre-2000
  - PPP post-2000
    - When business becomes **profitable**
    - A handful of counterparties
- **Prototypical infrastructures**
  - **Highways**, bridges and tunnels
  - Airports
  - Pipelines
  - River use and dams

# Highways: Basic Framework

- **The State's counterparties**

- Specialized state entities pre-2000
- Powerful private corporations post-2000
  - Significant grid : Vinci (ASF, Cofiroute, Escota, Arcour), Abertis (Sanef), Eiffage (SAPRR)
  - Marginal involvement: Powerful engineering and insurance groups (Axa, Bouygues, Egis)

- **Scope of the contract**

- Highway construction, maintenance and exploitation (1973/1975)  
**Adding highway design (2005/2008) and extension to related tunnels (2016)**
- Litigation: Administrative court (1973/1975/2005/2008)

- **Financing**

- State provides 30% to 50% (1973/1975), e.g. via real estate transfer (1975)
- State guarantees long term debt (1975)
- User must pay **fees** set by specialized entity/private counterparty (1973/1975/2005)

# Highways : Performance → Adaptation

## • Construction

- State of the art approach and good quality material, with counterparty bearing costs (1973/1975)  
Counterparty bears design and construction risk (2005/2008)
- Competitive bids (1973/1975) and use of third party (2005/2008)
- Within 53,5 (2005), respectively 26 (2008) months of contract in force
- Monitoring of contract performance (2005/2008)

## • Maintenance and exploitation

- Counterparty must maintain and exploit, bearing the related costs (1973/1975)
- Traffic safety and continuity to be guaranteed at all times, regardless of circumstances (1975/2005/2008)
- Insurance requirement for torts, unless sufficient reserves (2016)

## • Real estate

- Transferred by the State (1973/1975)
- Remains a State asset if transferred + transferred by the counterparty to the State at termination (2005/2008)

# Highways : Contract Resilience

- **Risk allocation**

- Design and construction risk allocated to counterparty (2005/2008)
- Highway opening can be delayed if due to circumstances out of the control of the counterparty (2005/2008)

- **Economic equilibrium**

- Impacted by new State requirement or regulatory changes or unforeseen circumstances (2005/2008)
- Adoption of required measures, including new user fees (2005/2008)

- **Force majeure**

- Allows non-authorized interruption of traffic (1973/1975/2005/2008)
- Immediate information of authorities(2005/2016)
- May limits or prevent liability vis-à-vis the State or users (1973/1975)

- **Contract termination**

- After 22 (1973), 20 years (1975), 55 (2008) and 65 years (2005)
- As a sanction for non-performance (1973/1975)
- As a contractual mechanism (2005/2008)

# Highways : (Very) Preliminary Conclusion

- **Innovation in terms of**
  - Risk and revenue allocation
  - Contract adaptation
- Focus on **performance and adaptation**
- Resistance: Traditional **force majeure** approach
- **Emerging discrete resilience clauses**