On the joint evolution of culture and institutions

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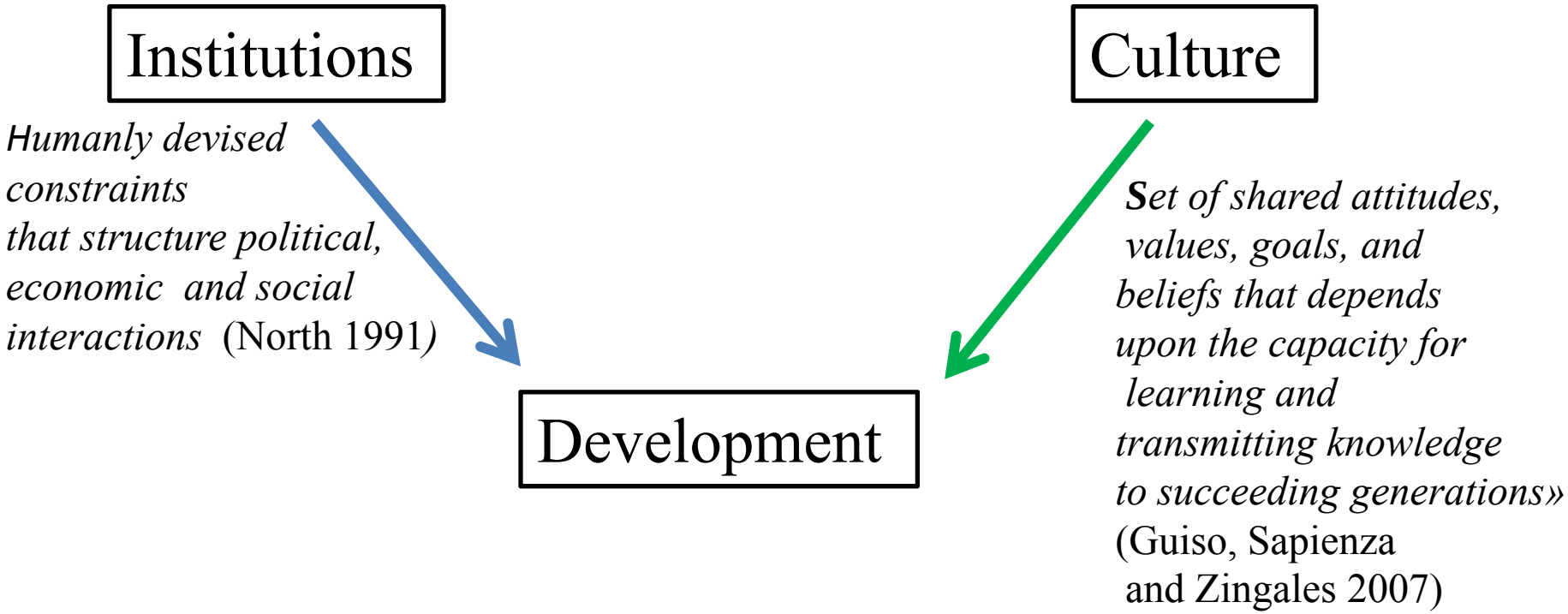
Motivation for this paper

Institutions and Culture as «Deep factors »



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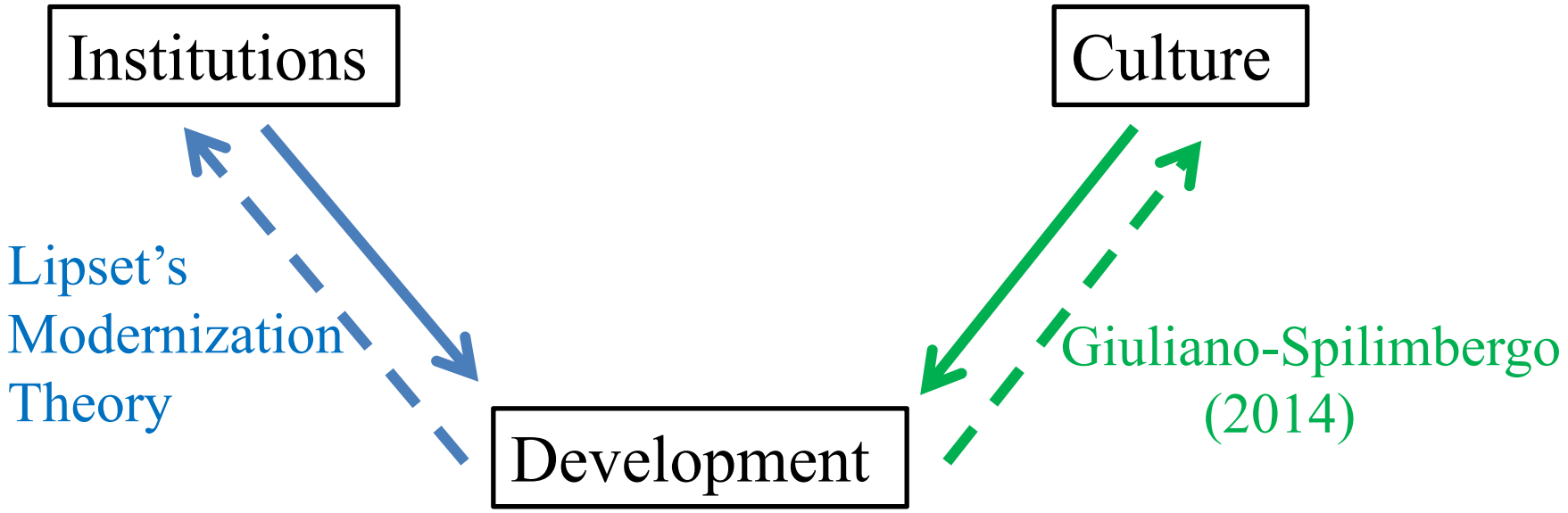
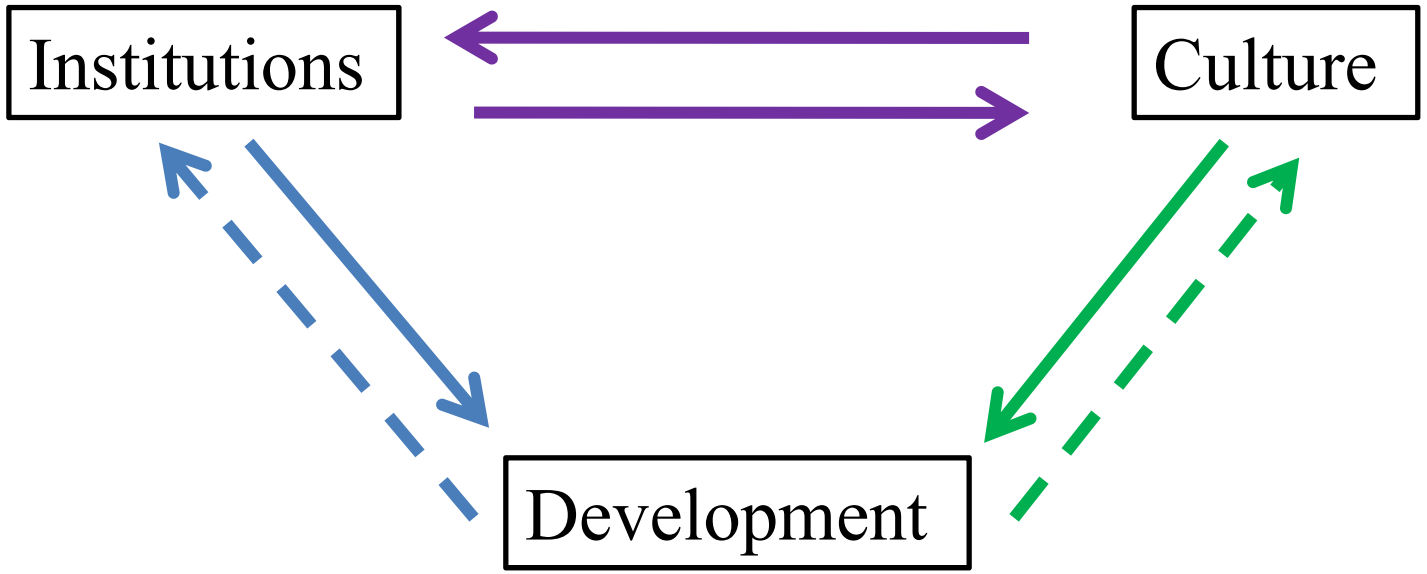


Motivation for this paper

joint interaction of Institutions and Culture



Interactions between Institutions and Culture

- Cultural attitudes affect institutional set-up:
  - Puritans, Cavaliers, Quakers, Scots-Irish in early waves of immigration into America, (Fischer (1989));
  - Genoese and Maghrebi traders and contracts, (Greif (1994)
  - Bourgeois values behind Magna Charta etc. in Medieval England (McCloskey 2006, 2010).
  - Family/kinship structures and social systems (Schulz 2016)

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- Institutions affect cultural traits:
  - Past institutions and individual values of norms of good conduct in Europe, Tabellini (2010)),
  - Attitudes towards corruption in Hong Kong after policy reform (Clark, 1987 1989; Hauk and Saez-Marti', 2002),
  - Attitudes towards redistribution and welfare states (Alesina and Angeletos, 2005; Alesina and Giuliano 2010) and in East Germany after unification (Alesina and Fuchs Schuendeln, 2005)
  - Caste system and indirect reciprocity (Hoff, Kshetramade and Fehr (2011))
  - Nation Building and cultural homogenization (Alesina and Reich (2014))
  - State centralization, and norms of rule following, propensity to cheat (Lowes, Nunn, Robinson, Weigel (2017))

Co-evolution between Institutions and Culture

- Welfare State/ Work ethic (Lindbeck 1995)
- Legal systems / norms of cooperation (Tabellini 2008)
- Regulation / Distrust (Aghion, Algan, Cahuc, Shleifer (2010))
- City states in Italy/ civic capital (Guiso, Sapienza, and Zingales, 2010)
- Educational sector /Market belief (Saint Paul 2010)
- Patriarchal institutions /gender attitudes (Alesina, Giuliano and Nunn, 2011)
- Law institutions / political whig culture in XVII England (Murrell and Schmidt 2011)
- City states and clan / generalized and restricted morality in Europe and China (Greif and Tabellini 2012)
- Knowledge Institutions/ religious and scientific beliefs (Benabou, Ticchi and Vindigni 2013)
- Political institutions/ political culture (Ticchi, Vindigni and Verdier 2013, Besley and Persson 2016)
- Labor/corporate contracts and Intrinsic.corportate Values (Hiller 2010, Besley and Ghatak (2016), Besley and Persson (2016))
- Enforcement Institutions and Trust (Bidner and François 200?)
- Labor contracts /reciprocity (Belloc and Bowles (2012)),
- Guilds, Markets, Clans/ Tacit knowledge (Delacroix, Doepke, Mokyr, 2017)
- State centralization/ norms of rule following (Lowes, Nunn, Robinson, Weigel 2017)
- Empirical survey (Alesina and Giulano 2015)

What this paper does ?

- Provide a simple formal *tractable* framework

  Institutional change  Cultural Change

- Institutions solve externalities/commitment issues that are influenced by cultural traits.

- Diffusion of traits is affected by incentives/ policies induced by institutions

- Dynamic complementarity /Substituability effects

What this paper does ?

- Role of initial conditions/ oscillations / cycles
- Comparative dynamics between institutions/culture:
  « Cultural » and « Institutional » multipliers
- Co-evolution between
  « Goal-oriented » and evolutionary changes
- Tractable abstract set-up :
  Stylized examples of social interaction problems:
  - redistribution / public good / externalities
  - occupational choices / investments / cooperation

Institutional Change

A simple mechanism design approach :

- Institutions designed to resolve a commitment/internalization problem associated to a policy choice

- Current institutions « choose » future institutions
  Cost : change of « de jure » power from point of view of current institutional system
  Gain: Internalization/commitment value

 institutional persistence

- Institutional change depends on cultural composition of society

culture  institutional change

Cultural Change

- Intergenerational cultural transmission
- « Cultural selection » depends :
  - on current cultural profile → persistence
  - on equilibrium policy outcomes

Institutions and policy outcomes → cultural change

A general set-up

- A society of homogeneous groups in terms of relevant characteristics, e.g., preferences (including cultural traits), resources, and technologies.

- Action of agents of group i : a^i $\quad \mathbf{a} = \{a^i\}$

- The (vector of) economic policies in society: p

- Agents of group i have preferences represented by an indirect utility function:

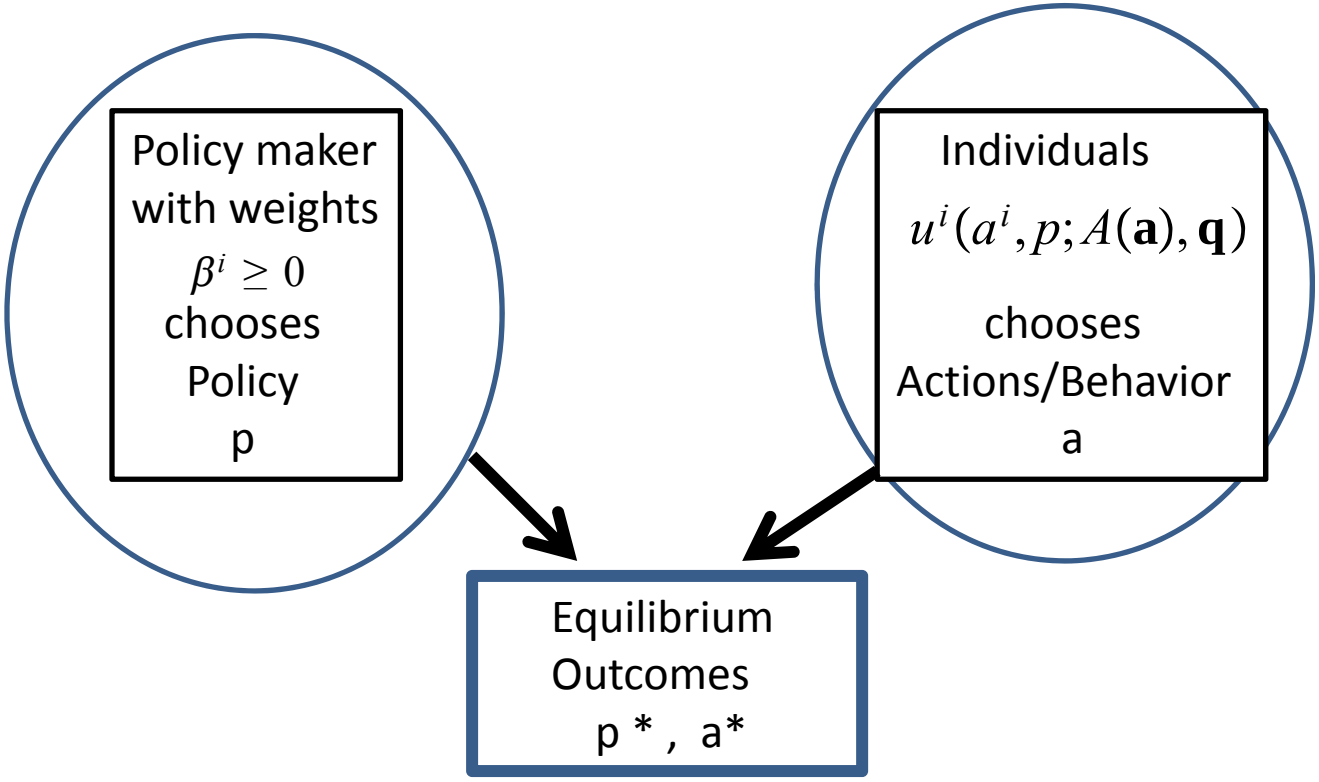
$$u^i(a^i, p; A(\mathbf{a}), \mathbf{q})$$

where A(**a**) captures indirectly an externality based on aggregator of actions **a**

Institutions and social equilibrium

- Identify institutions with weights in a social choice problem which determines policies:
  weight associated to each group i : $\beta^i \geq 0$
  normalized so that: $\sum_i \beta^i = 1$

Policy game:



Institutions and social equilibrium

- *A societal equilibrium* given institutions $\boldsymbol{\beta}$ and the cultural population $\mathbf{q}$:
  Nash equilibrium of the policy game: $\{\mathbf{a},\mathbf{p}\}$

$$p \in \arg\max_{p'} \sum_i \beta^i \; u^i(a^i, p'; A(\mathbf{a}), \mathbf{q})$$

$$a^i \in \arg\max_a \; u^i(a, p; A(a, \mathbf{a}^{-i}), \mathbf{q}) \quad i \in I$$

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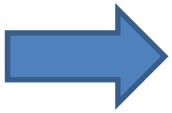
- A *societal commitment equilibrium* given institutions $\boldsymbol{\beta}$ and the cultural distribution $\mathbf{q}$:
  Stackelberg Nash equilibrium of same policy game,
  where policy maker is assumed to be the leader: $\{\mathbf{a}^{com}, p^{com}\}$

$$\{\mathbf{a}^{com}, p^{com}\} \in \arg\max_{p'} \sum_i \beta^i \; u^i(a^i, p'; A(\mathbf{a}), \mathbf{q})$$

$$s.t. \quad a^i \in \arg\max_a \; u^i(a, p, A(a, \mathbf{a}^{-i}), \mathbf{q}), \quad i \in I$$



commitment/internalization issue on the part of the policy maker

Institutions and social equilibrium

- Societal equilibrium

$$\left[\mathbf{a}(\boldsymbol{\beta},\mathbf{q}),\ p(\boldsymbol{\beta},\mathbf{q})\right]$$

- Societal equilibrium payoffs:

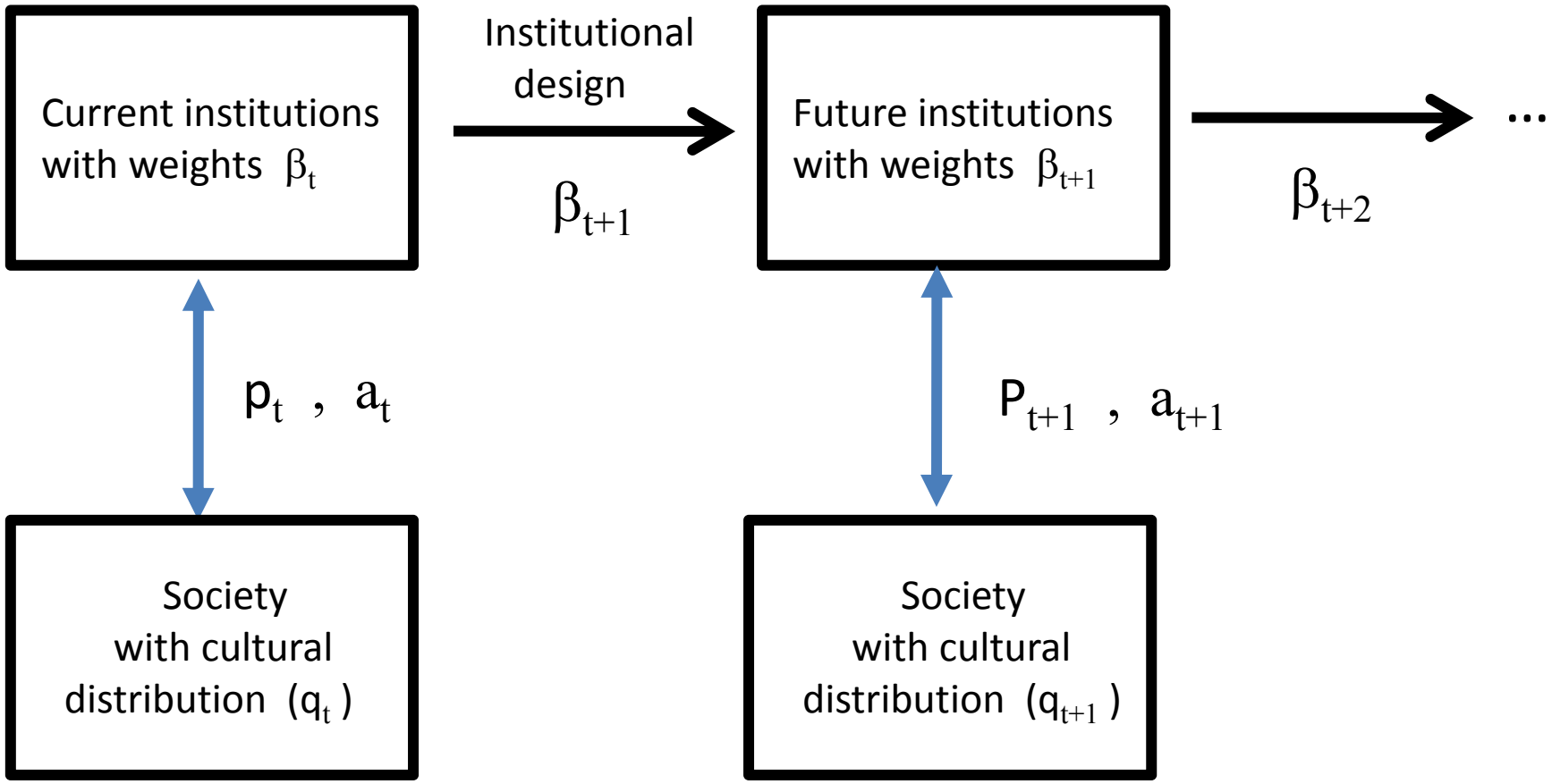
$$U^i(\boldsymbol{\beta},\mathbf{q}) = u^i(a^i(\beta,\mathbf{q}),p(\beta,\mathbf{q});A(\mathbf{a}(\beta,\mathbf{q})),\mathbf{q})$$

- Societal commitment equilibrium :

$$\left[\mathbf{a}^{com}(\boldsymbol{\beta},\mathbf{q}),\ p^{com}(\boldsymbol{\beta},\mathbf{q})\right]$$

The dynamics of institutions (given cultural distribution)

- Future institutional set-up : set by current institutional set-up:



The dynamics of institutions (given cultural distribution)

- Future political and economic institutions are set (myopically) by the present institutional set-up:
  The dynamics of institutions is determined by:

$$\max_{\beta_{t+1}} \; V(\beta_t, \beta_{t+1}, q_{t+1}) = \sum_i \beta_t^i \; U^i(\boldsymbol{\beta}_{t+1}, \mathbf{q}_{t+1})$$

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- Current institutions $\boldsymbol{\beta}_t$ induce the choice $p(\boldsymbol{\beta}_t, \mathbf{q}_{t+1})$ at equilibrium but they prefer policy outcome $p^{com}(\boldsymbol{\beta}_t, \mathbf{q}_{t+1})$

- set ("delegate to") institutions $\boldsymbol{\beta}_{t+1}$ such that:

$$p(\boldsymbol{\beta}_{t+1}, \mathbf{q}_{t+1}) = p^{com}(\boldsymbol{\beta}_t, \mathbf{q}_{t+1})$$

- Whenever this is not possible, set ("delegate to") institutions ensuring at equilibrium a policy choice p as close as possible to $p^{com}(\boldsymbol{\beta}_t, \mathbf{q}_{t+1})$

The dynamics of institutions: Characterization

- "Current institutions" designs institutional change to "solve" own commitment policy problem

" de jure" delegation to new set of institutions

- Constrained efficiency gains from incremental institutional change
- Optimal political delegation: residual decision rights over policy to groups most likely to internalize social/political externalities

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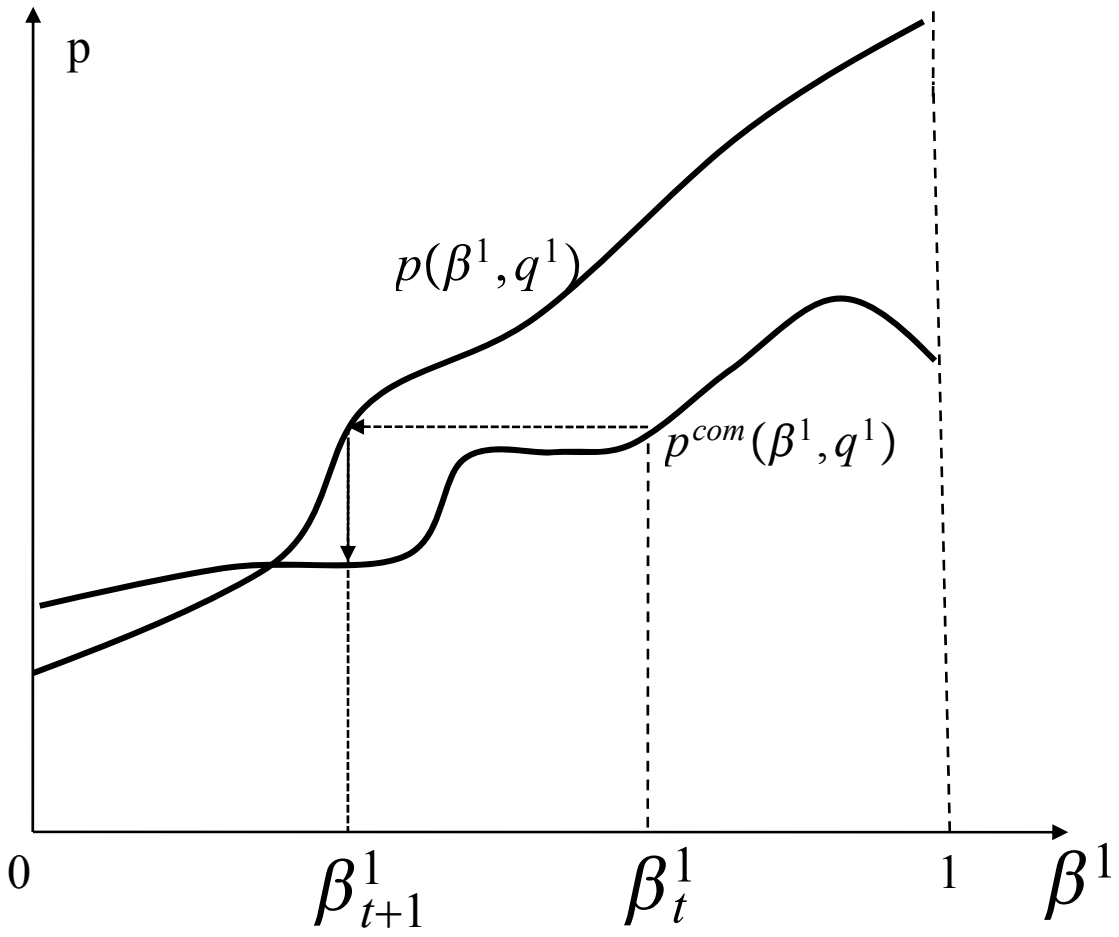
  - For 2 groups : unidimensional institutional change β

- When $p(\beta, \mathbf{q})$ is monotonic in β , complete stability analysis of the dynamics of institutions depends on structure of the set of zeros of the function

$$P(\beta, q) := p(\beta, q) - p^{com}(\beta, q)$$



Institutional Change

The dynamics of culture

- A model of socialization / cultural transmission
- Transmission of values : Parents and Society
  Economic Interactions
  Evolutionary Dynamics

Bisin and Verdier (2001, 2010), Cavalli- Sforza and Feldman (1973, 1981) , Boyd and Richerson (1985)

- Replicator Dynamics of populations :

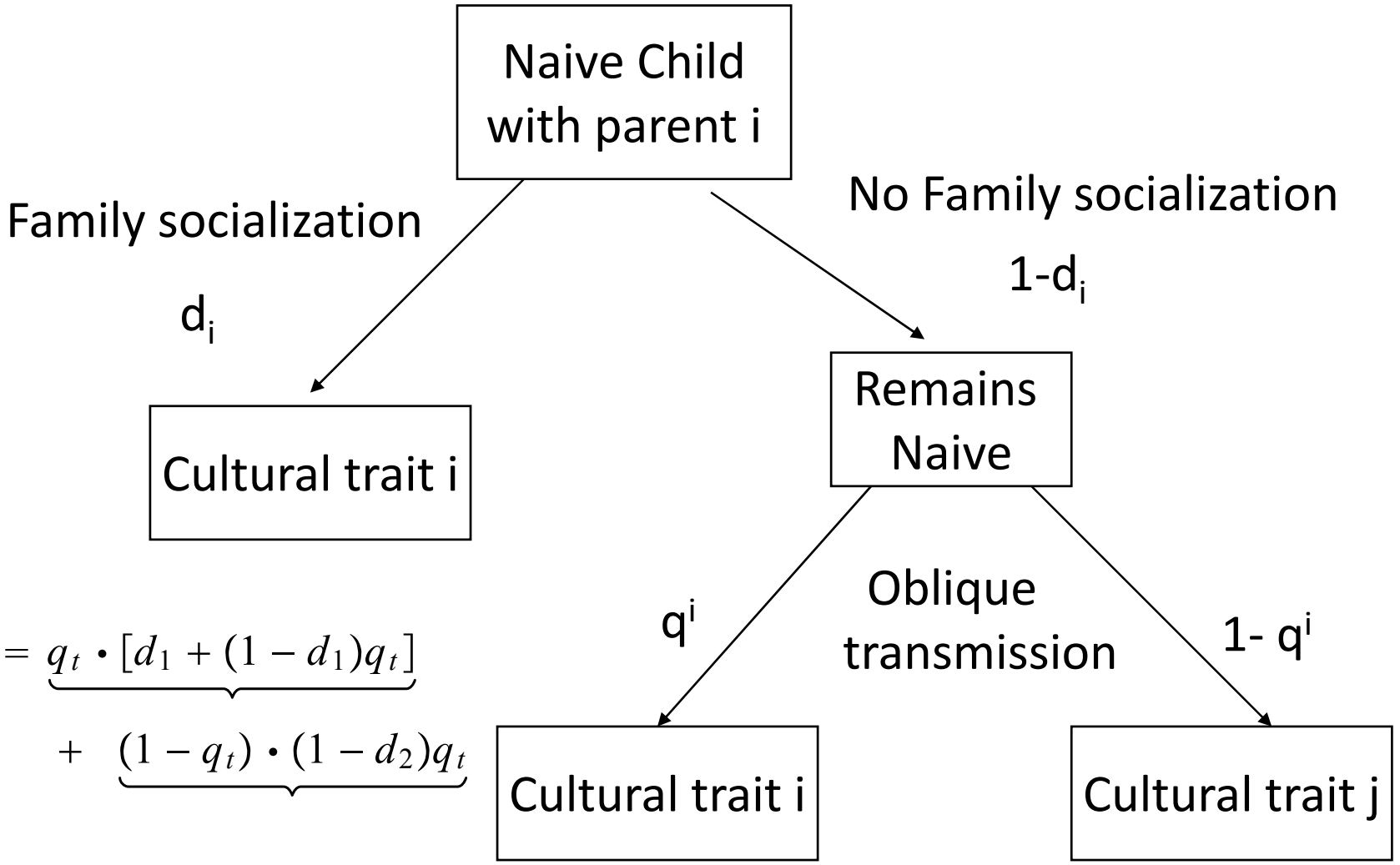
$$q^i_{t+1} - q^i_t = q^i_t \cdot \sum_{j \neq i} q^j_t (d^i_t - d^j_t)$$

- Endogenous socialization rates: $d^i = d(\mathbf{q}, \Delta V^i(\boldsymbol{\beta}, \mathbf{q}))$

opportunity costs/ social structure/ paternalistic motivations
(institutions of cultural transmission)

Simple two trait model of Cultural Transmission

(Bisin and Verdier 2001)



$$q_{t+1} = \underbrace{q_t \cdot [d_1 + (1-d_1)q_t]}_{} + \underbrace{(1-q_t) \cdot (1-d_2)q_t}_{}$$

Simple two trait model of Cultural Transmission

$$\dot{q}_t = q_t(1-q_t)\cdot(d_1 - d_2)$$

2 traits , 1,2: Utility functions : $U_1(\mathbf{x})$; $U_2(\mathbf{x})$

Optimal behaviors : $\mathbf{x}_1(.)$ $\mathbf{x}_2(...)$

$$d_1 \in \arg\max\left\{[d_1 + (1-d_1)q_t]U_1(\mathbf{x}_1) + (1-d_1)(1-q_t)U_1(\mathbf{x}_2) - C(d_1)\right\}$$

$$d_2 \in \arg\max\left\{[d_2 + (1-d_2)(1-q_t)]U_2(\mathbf{x}_2) + (1-d_2)q_t U_2(\mathbf{x}_1) - C(d_1)\right\}$$

Optimal socialization : $C'(d_1) = (1-q_t)\Delta V^1, \quad C'(d_2) = q_t \Delta V^2$

Paternalistic motivations :

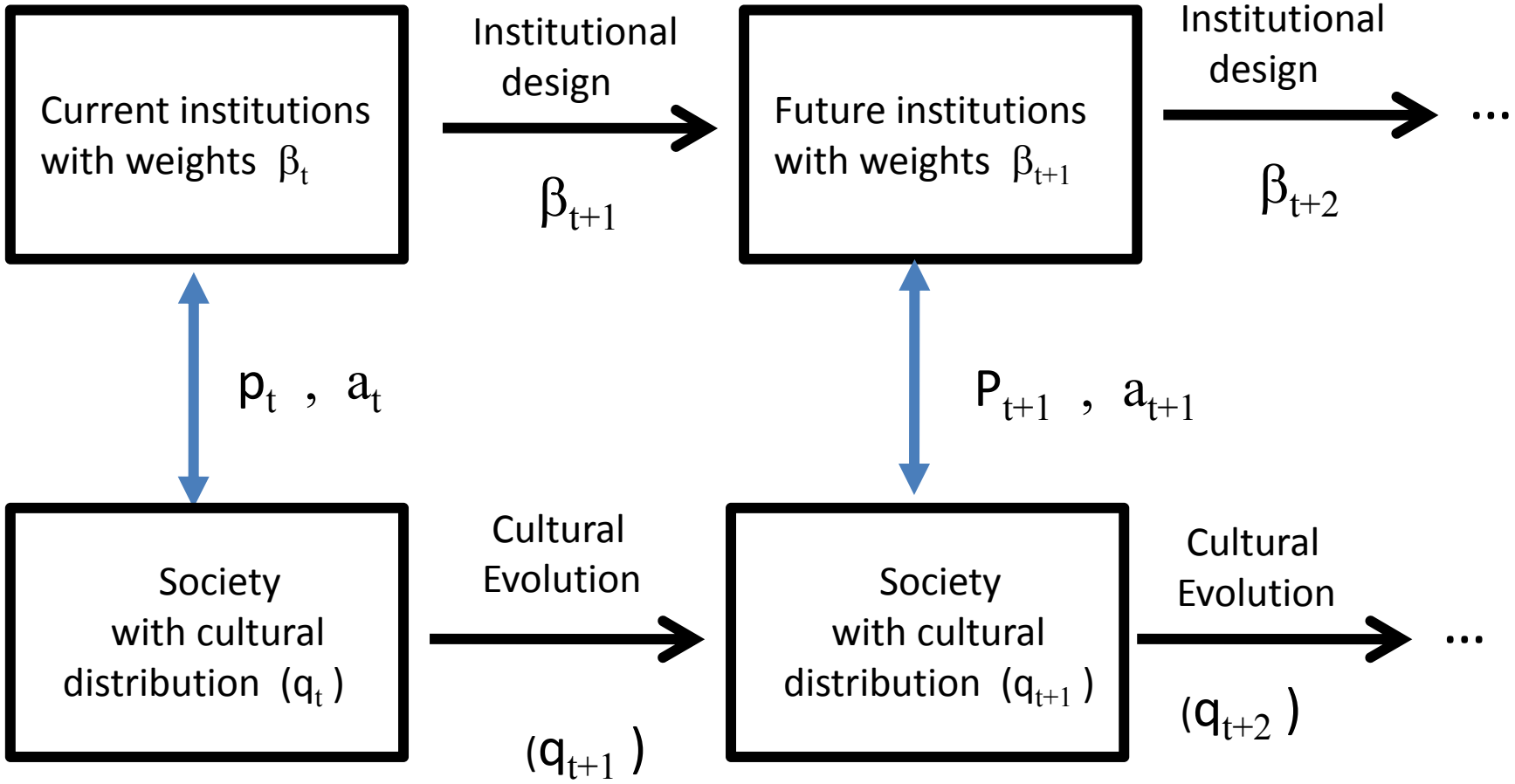
$$\Delta V^1 = U_1(\mathbf{x}_1) - U_1(\mathbf{x}_2)$$

$$\Delta V^2 = U_2(\mathbf{x}_2) - U_2(\mathbf{x}_1)$$

Optimal transmissions : $d_1[\Delta V^1(.)]$ $d_2[\Delta V^2(.)]$

Steady states : $\dfrac{q}{1-q} = \dfrac{\Delta V^1(.)}{\Delta V^2(.)}$

On the joint dynamics of culture and institutions



On the joint dynamics of culture and institutions

- System for 2 political groups / 2 cultural traits

$$\beta_{t+1} = \begin{cases} \beta \text{ such that } p^{com}(\beta_t, q_{t+1}) = p(\beta, q_{t+1}) \\ \begin{cases} 1 & \text{if } p^{com}(\beta_t, q_{t+1}) > p(\beta, q_{t+1}), \ \forall 0 \leq \beta \leq 1 \\ 0 & \text{if } p^{com}(\beta_t, q_{t+1}) < p(\beta, q_{t+1}), \ \forall 0 \leq \beta \leq 1 \end{cases} \end{cases}$$

$$q_{t+1} - q_t = q(1 - q_t)D(\beta_{t+1}, q_{t+1}).$$

On the joint dynamics of culture and institutions

- The dynamical system has at least one stationary state
- Dependence on initial conditions
- Dynamic complementarities/substituabilities

- At a locally stable interior steady state (β^*, q^*) local dynamics of culture /institutions show no converging cycles (dampening oscillations) when institutional and cultural dynamics are complements.
- Existence of stable converging oscillations when institutional and cultural dynamics are substitutes, and intermediate range of relative rates of change between culture and institutions
- Comparative dynamics: Cultural/institutional multipliers

Some Examples

- Elites, bourgeois culture and Extractive institutions
- Civic capital and democratization
- Culture of Violence and property rights protection
- Modernization and time preferences
- Work ethic and redistribution

Elite and Extractive institutions (1)

- Economy populated by a mass of workers in proportion 1-λ (i = 1) and Elite members in proportion λ (i = 2)

- Elite tax workers' income at rate p to redistribute to itself

Mass: $u^1(a^1, p) = u((1-p)a^1) + v(1-a^1)$

Elite: $\begin{cases} \text{"bourgeois"}: \quad u^{2b}(a^{2b}, T) = u(T + s + a^{2b}) + v(1-a^{2b}) \\ \text{"aristocrat"}: \quad u^{2a}(a^{2a}, T) = u(T + s + a^{2a}) + \theta v(1-a^{2a}) \end{cases}$

« bourgeois » : proportion q / « aristocrats » proportion 1- q

- Subsistence endowments : $s^1 = 0$ and $s^2 = s > 0$

- Survival consumption level : $c \geq \bar{c}$ (not binding for Elite $s > \bar{c}$)

Elite and Extractive institutions (2)

- Policy maker objective function:

$$W(\beta, \mathbf{a}, p, T, q) = \beta \cdot u^1(a^1, p) + (1-\beta) \cdot [q u^{2b}(a^{2b}, T) + (1-q) u^{2a}(a^{2a}, T)]$$

$$T = p a^1 \frac{1-\lambda}{\lambda}$$

- Mass effort: $a^1(p)$ 2 regimes:

- "non extractive" regime: survival constraint is not binding

- " extractive regime" where the survival constraint is binding

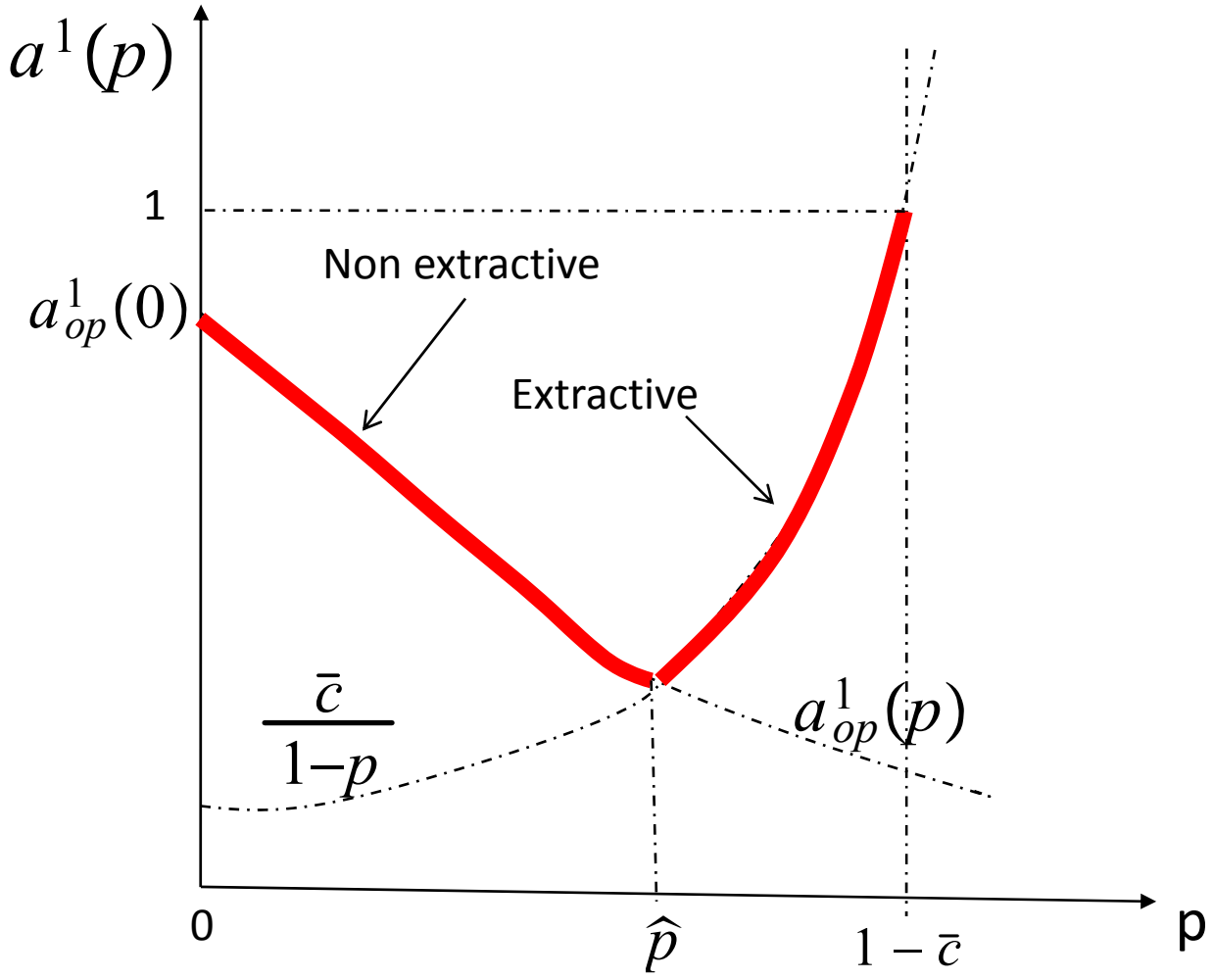


Figure 1: : Elite, Workers and Extractive institutions
Optimal Effort of the Mass workers

Elite and Extractive institutions (3)

- optimal behavior of a "bourgeois" elite member : $a^{2b}(T)$
  an "aristocrat" elite member : $0 \quad (\theta > \frac{u'(s)}{v'(1)})$

- *Societal equilibrium policy* $p(\beta,q)$:

$$p \in \arg\max_{p\in[0,1-\bar{c}],T\geq 0} W(\beta,\mathbf{a},p,T,q)$$

$$T = pa^1\frac{1-\lambda}{\lambda}$$

for given $\mathbf{a} = (a^1, a^{2b}, a^{2a})$

$$a^1 = a^1(p);\ a^{2b} = a^2(T),\ a^{2a} = 0 \text{ and } T = pa^1\tfrac{1-\lambda}{\lambda}$$

$$\Rightarrow \quad p = p(\beta,q)$$

Decreasing in β and q

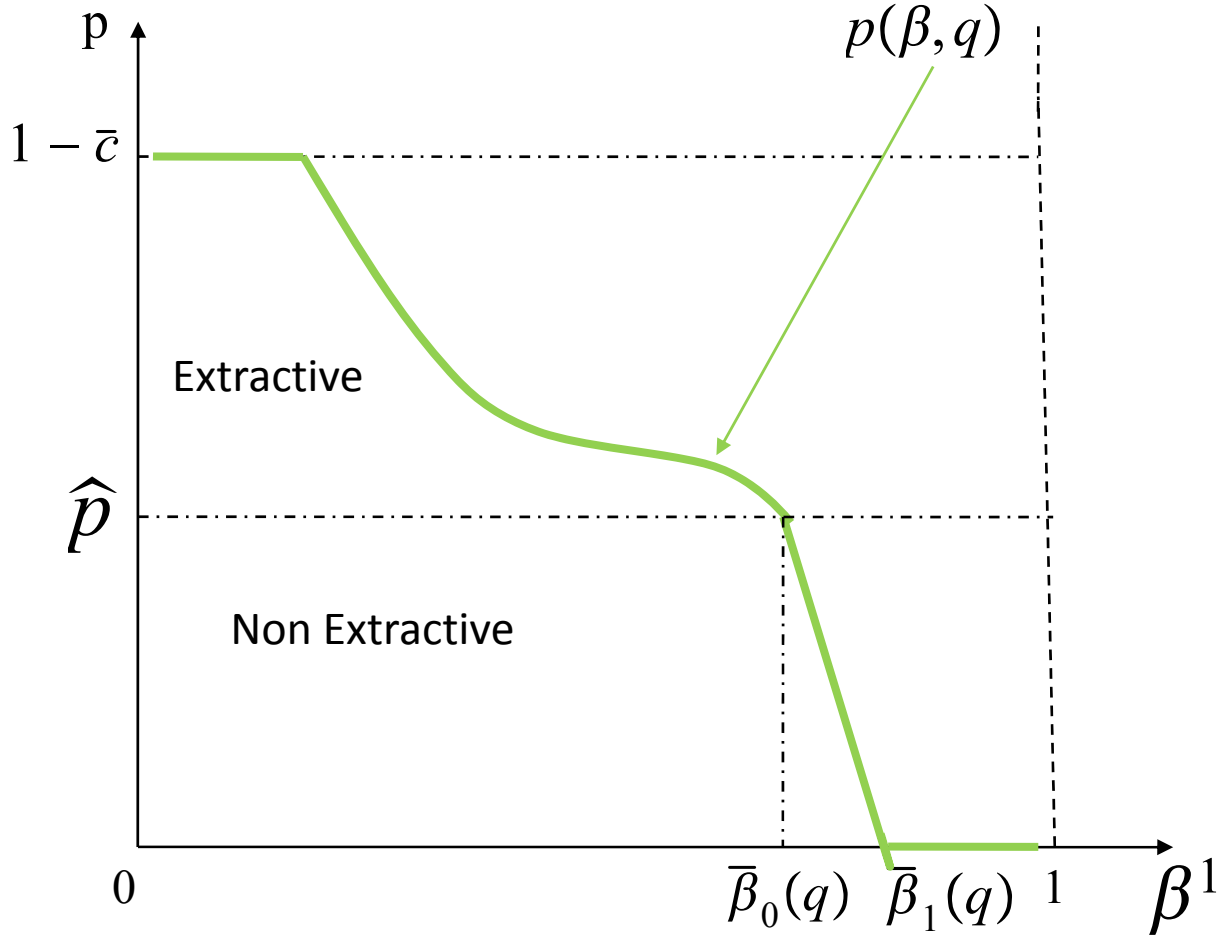


Figure 2: Elite, Workers and Extractive institutions
Societal EquilibriumPolicy

Elite and Extractive institutions (4)

- *Societal commitment equilibrium policy* $p^{com}(\beta,q)$:

$$p \in \arg\max_p \widetilde{W}(p,\beta,q) = W(\beta,\mathbf{a}(p),p,T(p),q)$$

$$\mathbf{a}(p) = (a^1(p),a^2(T(p)),0) \text{ and } T(p) = pa^1(p)\frac{1-\lambda}{\lambda}$$

$$p^{com}(\beta,q)$$

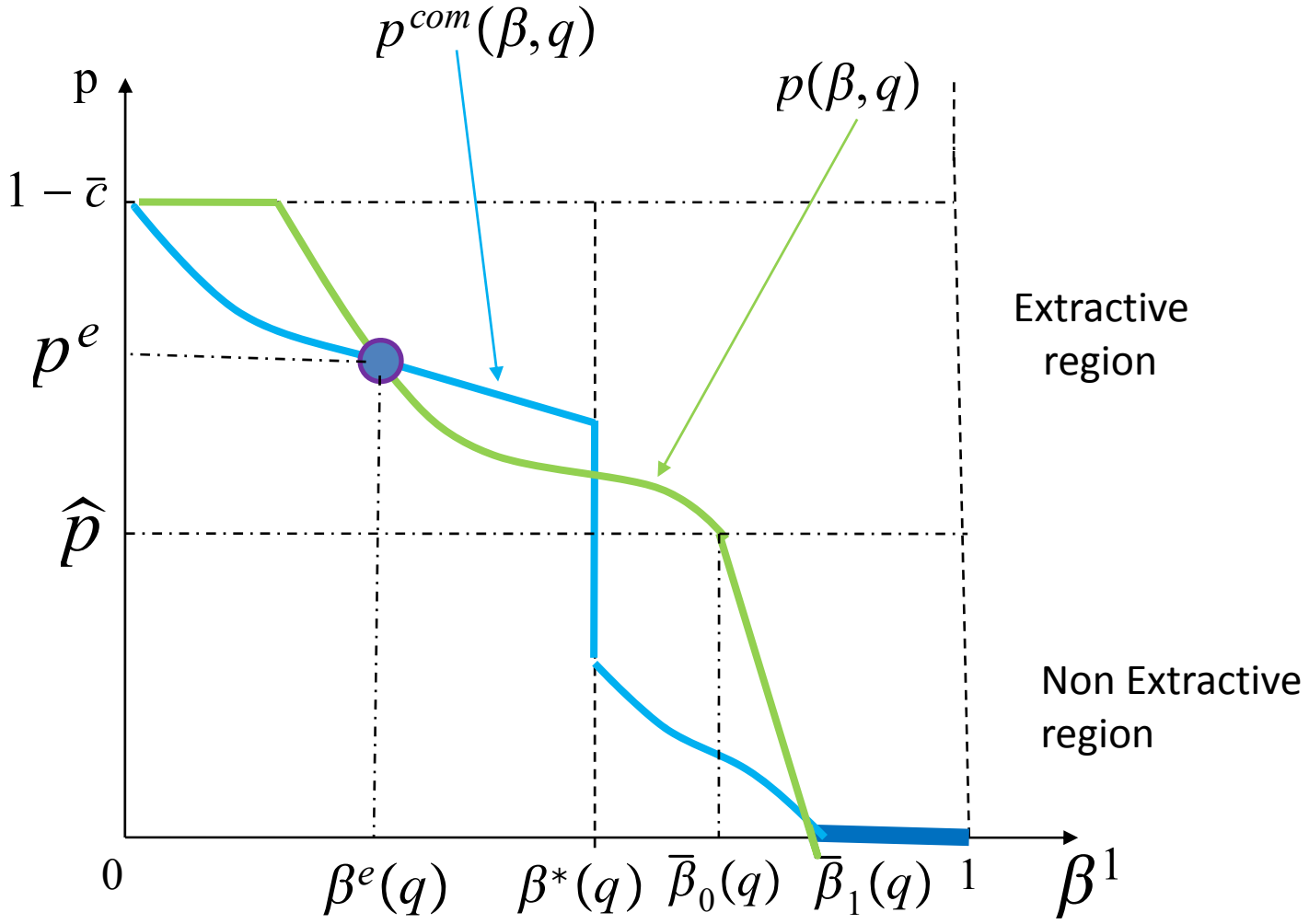


Figure 2: Elite, Workers and Extractive institutions
Equilibrium Policies

Elite and Extractive institutions (5)

- Non extractive regime: $p^{com}(\beta,q) < p(\beta,q)$
  - internalization of disincentive effect of taxation on tax base

- Extractive regime:
  - internalization of (by now) positive effect of taxation on workers' effort and tax base $\longrightarrow$ $p^{com}(\beta,q) > p(\beta,q)$

  - internalization of taxation effect on survival binding constraint: workers are forced to remain on survival binding constraint (not their best effort) $\longrightarrow$ $p^{com}(\beta,q) < p(\beta,q)$

Elite and Extractive institutions (6)

- Institutional dynamics :

- Multiple institutional steady states:

  low power to the workers in extractive regime

  high power to the workers in non extractive regime

- Dependence on initial conditions:

  Low initial workers' representation $\longrightarrow$ extractive regime

- High initial workers' representation $\longrightarrow$ non extractive regime

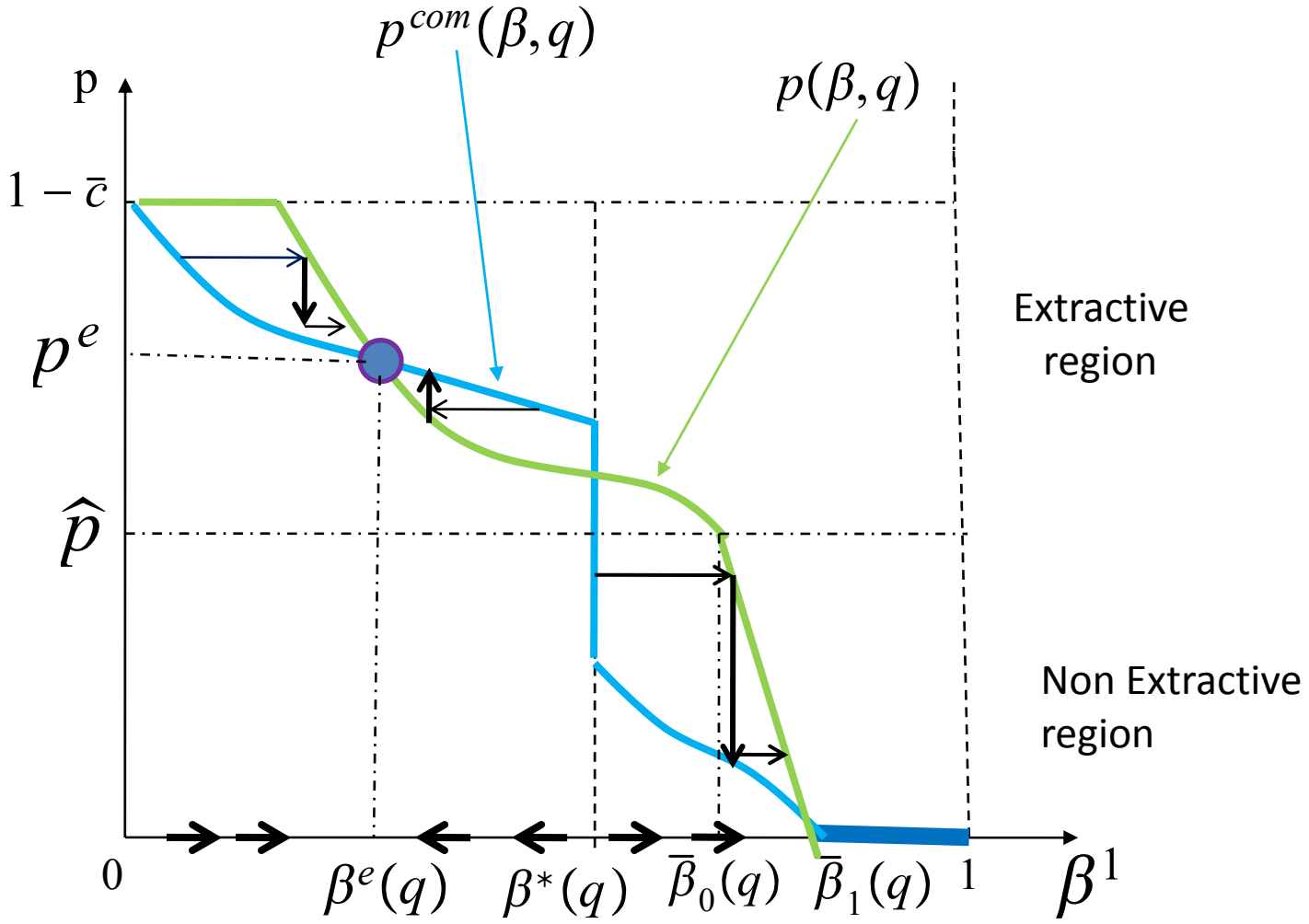
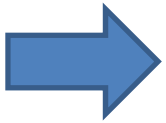


Figure 2: Elite, Workers and Extractive institutions
Equilibrium Policies and Institutional Dynamics

Elite and Extractive institutions (7)

- Cultural dynamics:
  - Intergenerational cultural socialization within own group.
  - Children of workers have workers' preferences
  - Elite group : diffusion of "bourgeois" vs "aristocratic values
  - Cultural socialization incentives: "bourgeois" vs "aristocrat"
  - When the elite enjoys larger rents because of p , "aristocratic" preferences tend to have a cultural evolutionary advantage compared to "bourgeois" work oriented values.

- As $p(\beta,q)$ is decreasing in institutional weight β of workers,



the more influential workers are in society,
the larger the diffusion of "work-oriented" values

Dynamic Complementarity vs Substituability

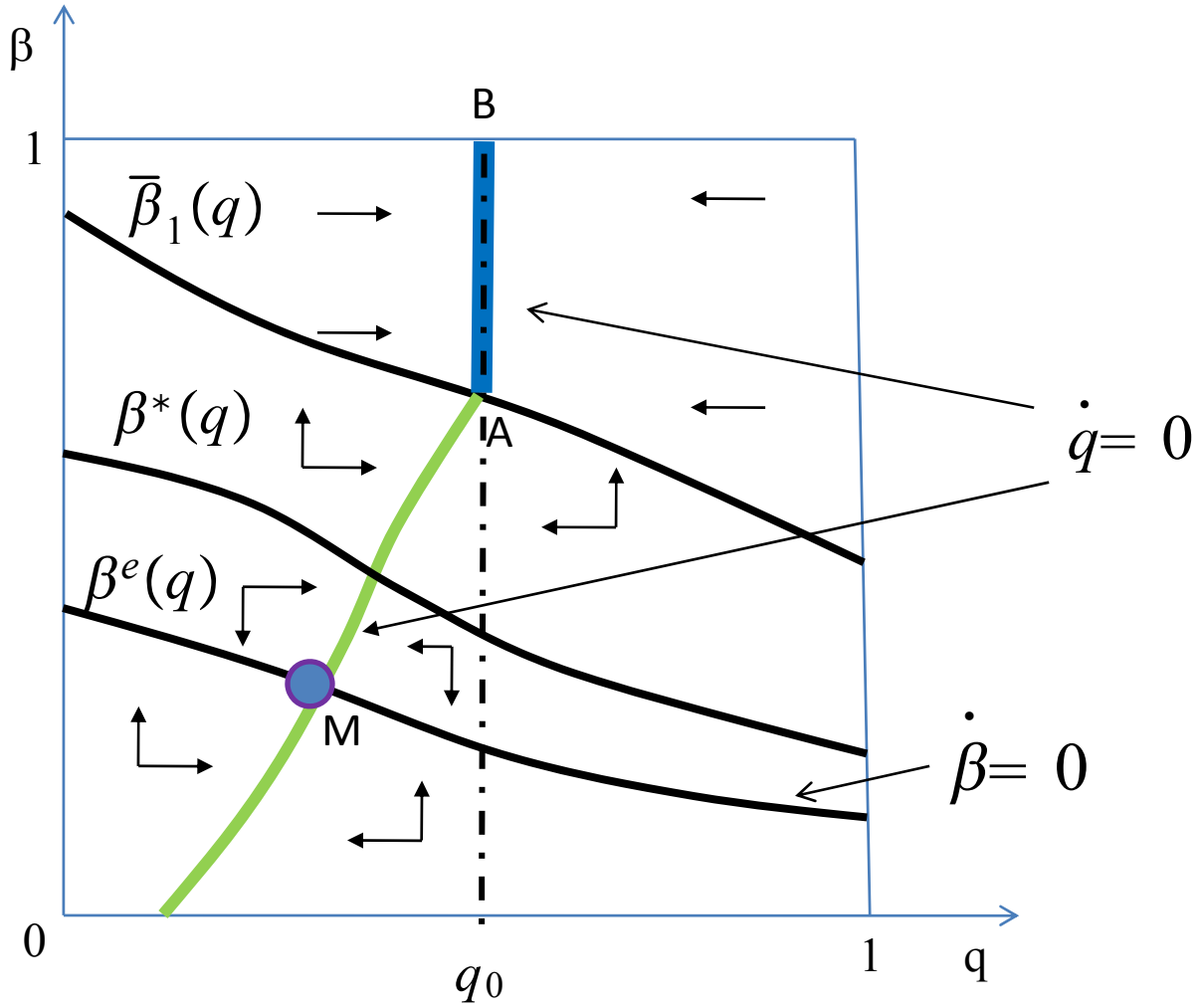


Figure 3: Elite, Workers and Extractive institutions
Phase Diagram Coevolution institutions-culture

Comparative dynamics : Exogenous institutional shock

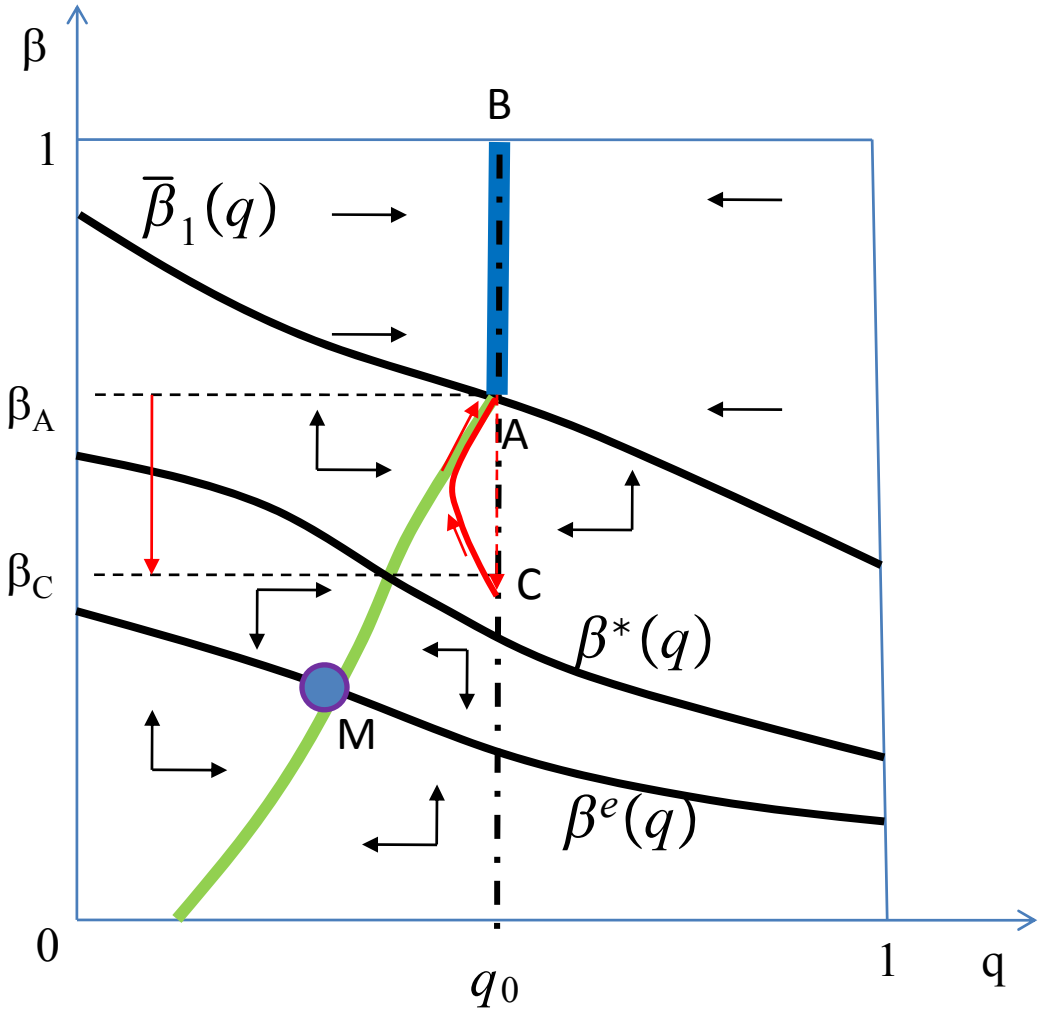


Figure 4: Elite, Workers and Extractive Institutions Shock ,Transition and Co-evolution of Institutions and Culture

Conclusions

- Institutional and Cultural co-evolution : a tool box model to analyse joint process
- Complementarity or substituability: other examples
  education investment /redistribution/ work ethic
  property right protection and conflict-prone preferences
- Religious Elites and Political Legitimacy (Bisin, Seror and Verdier 2018)

- Institutional evolution : - Myopic vs forward looking
  - De facto /de Jure Power
  - Centralized design vs Decentralized (evolutionary)
  - Institutional strategic interdependences
- Cultural evolution : - Coordinated vs Evolution: structured populations
  - Multi-level selection processes (group selection and institutions)

Property Rights and Conflict (1)

- Social Context where agents contest each other's resources

- How a “culture of Honor” (propensity to act violently) interacts with development of legal system for protection of property rights ? (Nisbett (1993), Cohen and Nisbett (1994), Grosjean (2014)).

- Agents are matched randomly in a contest for their own endowment.
- Relative effort determines the probability of success to win part of endowment not protected by property rights.
- Cultural group more prone to violence: lower cost of violent effort

- Property right protection: policy variable.
  - favored by group less prone to violence,
  - may be favored also by more prone to violence group when its fraction in the population is large enough.

Property Rights and Conflict (2)

- Political and cultural groups are aligned.
- Group i=1 is more prone to violent conflict: fraction q
- Marginal cost of violent effort c^i for i=1,2: $c^1 < c^2$

  $\alpha = (c^2 - c^1)/c^1$

- Agent's endowment prior to the contest : $\omega > 0$
- Policy variable, p : protected fraction of each agent's endowment

- Agent h matching with agent k: violent efforts a^{hk} and a^{kh}

  proba for h of winning contest : $\frac{a^{hk}}{a^{hk}+a^{kh}}$

  winner of contest appropriates $2(1-p)\omega$ units of consumption good

  contest is complete information game

- Nash equilibrium efforts of agent of type i in contest with agent type j:

$$a^{ij} = 2(1-p)\omega \frac{c^j}{(c^i+c^j)^2}$$

Property Rights and Conflict (3)

- Expected payoffs of agents of group i=1,2 :

$$G_1(p,q,a^{11},a^{12},a^{21}) = p\omega + q\left(2(1-p)\omega\frac{a^{11}}{a^{11}+a^{11}} - c^1a^{11}\right) + (1-q)\left(2(1-p)\omega\frac{a^{12}}{a^{12}+a^{21}} - c^1a^{12}\right)$$

$$G_2(p,q,a^{21},a^{12},a^{22}) = p\omega + q\left(2(1-p)\omega\frac{a^{21}}{a^{21}+a^{12}} - c^2a^{21}\right) + (1-q)\left(2(1-p)\omega\frac{a^{22}}{a^{22}+a^{22}} - c^2a^{22}\right)$$

At the Nash equilibrium efforts: $a^{ij} = 2(1-p)\omega\frac{c^j}{(c^i+c^j)^2}$

- Equilibrium Payoffs Ω_1(p,q) and Ω_2 (p,q):

For violence prone individuals Ω_1(p,q): decreasing in q,
increasing in p if $q \geq \tilde{q}(\alpha)$

For non violence prone individuals: Ω_2 (p,q) decreasing in q,
increasing in p

- Property rights protection implementation cost : C(p) convex,
increasing

Property Rights and Conflict (4)

- The societal equilibrium p(β,q) :

  - Policy game for social planner:

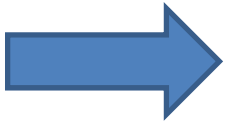
$$\max_p \beta G_1(p,q,a^{11},a^{12},a^{21}) + (1-\beta)G_2(p,q,a^{21},a^{12},a^{22}) - C(p)$$

given $a^{11}, a^{12}, a^{21}, a^{22}$

  - Nash equilibrium levels of contest efforts

$$a^{11} = \frac{2(1-p)\omega}{4c},\ a^{22} = \frac{2(1-p)\omega}{4c(1+\alpha)}$$

$$a^{12} = 2(1-p)\omega\frac{1+\alpha}{c(2+\alpha)^2},\ a^{21} = 2(1-p)\omega\frac{1}{c(2+\alpha)^2}$$



When β < q : p(β,q) > 0 with p(β,q) decreasing in β
increasing in q

When β ≥ q : p(β,q) = 0 : no protection of property rights

Property Rights and Conflict (5)

- The societal commitment equilibrium $p^{com}(\beta, q)$:

  - Policy game for social planner:

$$\max_p \beta\Omega_1(p,q) + (1-\beta)\Omega_2(p,q)$$

- When $q < \tilde{q}(\alpha)$ and $\beta \geq \tilde{\beta}(q)$ $p^{com}(\beta,q) = 0$
  no protection of property rights

  $\tilde{\beta}(q)$ increasing in q

- Otherwise $p^{com}(\beta,q) > 0$ decreasing in β
  increasing in q

- $p(\beta,q) \leq p^{com}(\beta,q)$

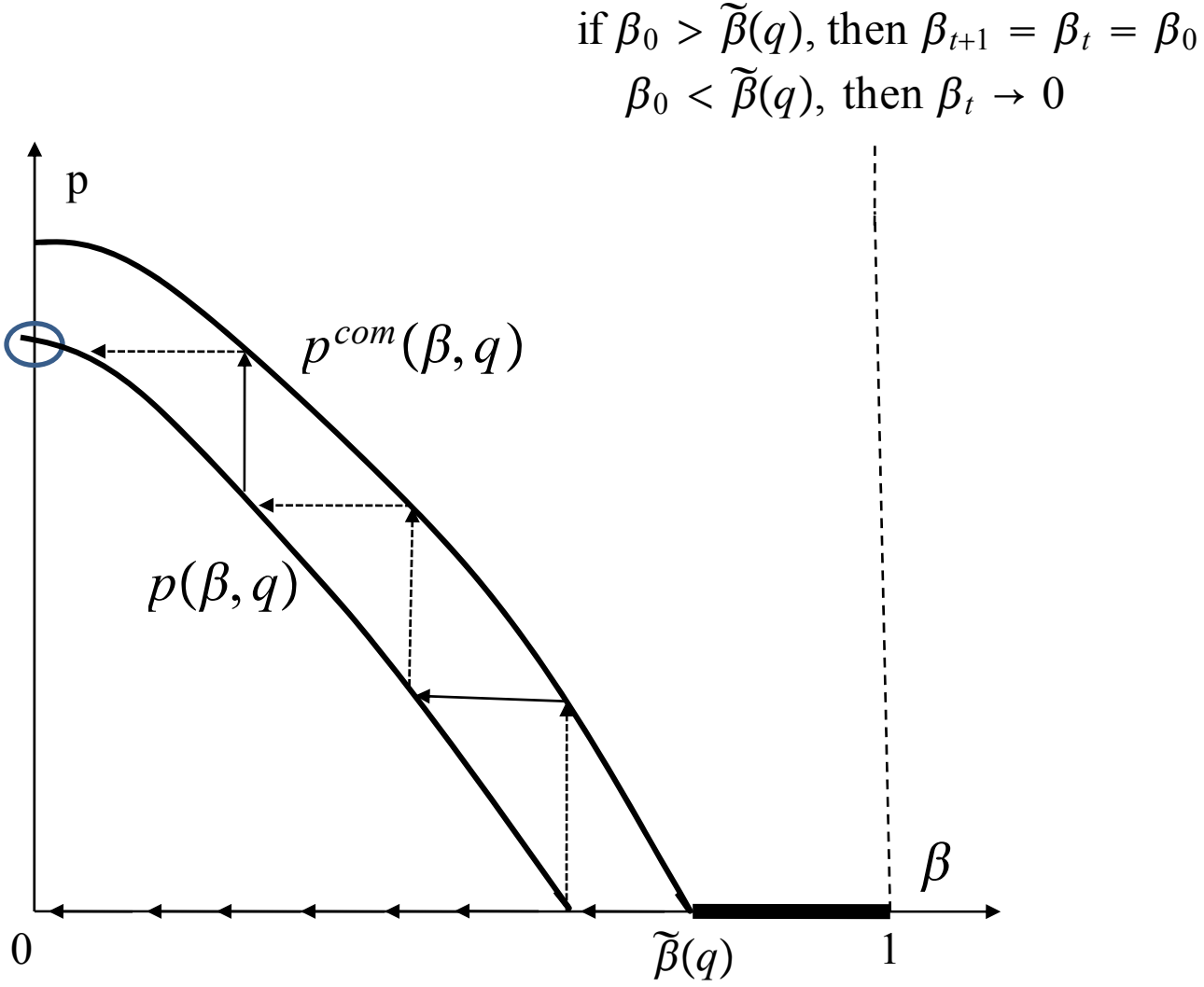


Figure 9: Property rights and conflicts
Institutional dynamics

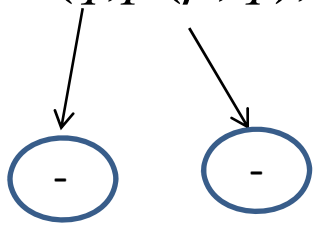
Property Rights and Conflict (6)

- Cultural dynamics:

Socialization incentives $\Delta V^1(p,q) > 0$ decreasing in p, decreasing in q

and $\Delta V^2(p,q) > 0$ decreasing in p, increasing in q

steady state condition: $\frac{\Delta V^1}{\Delta V^2} = \Phi(q, p(\beta, q), \alpha) = \frac{q}{1-q}$



Relative incentives for transmission of violence prone culture
decrease with extent of violence culture
decrease with protection of property rights

- Cultural steady state manifold: q(β) increasing in β.
  with larger political power of violent prone group:
  more diffusion of the culture of violence

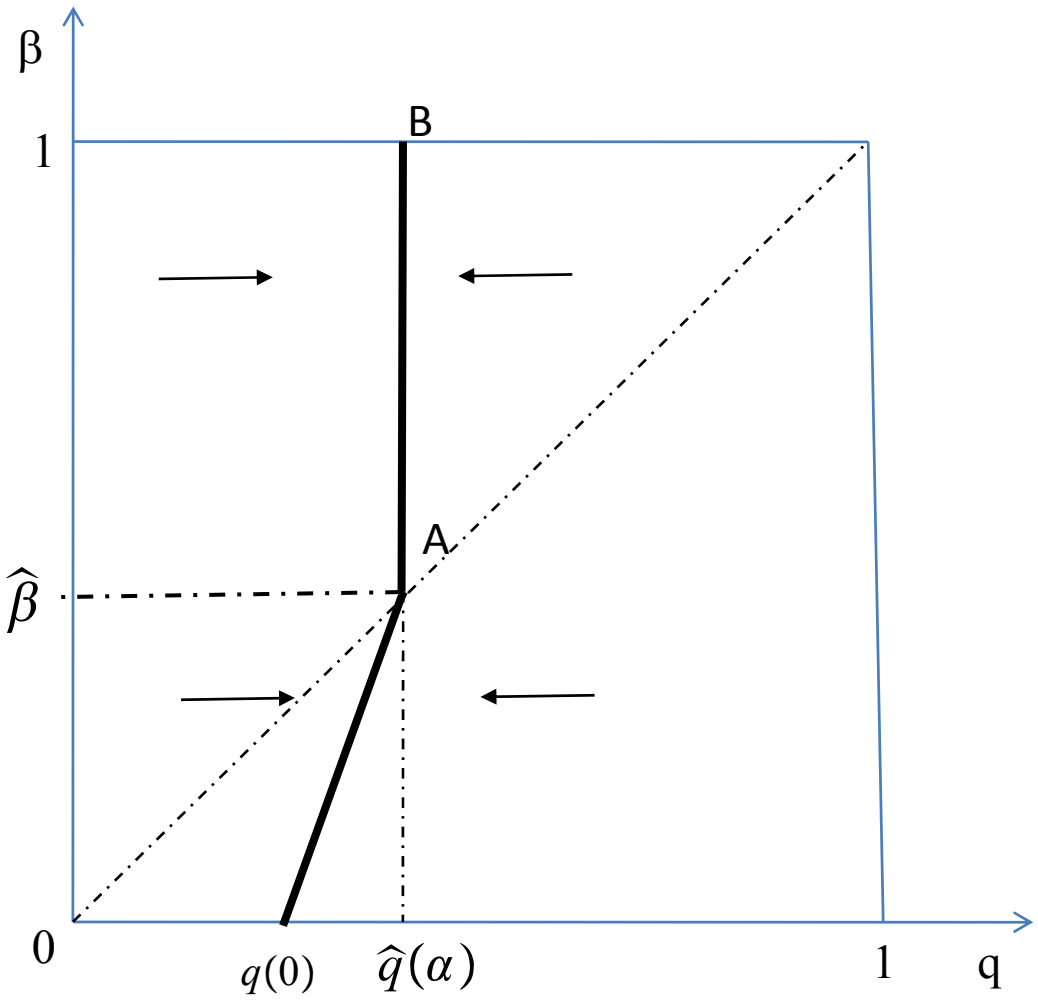


Figure 10: Property rights and conflicts
cultural dynamics (α large enough)

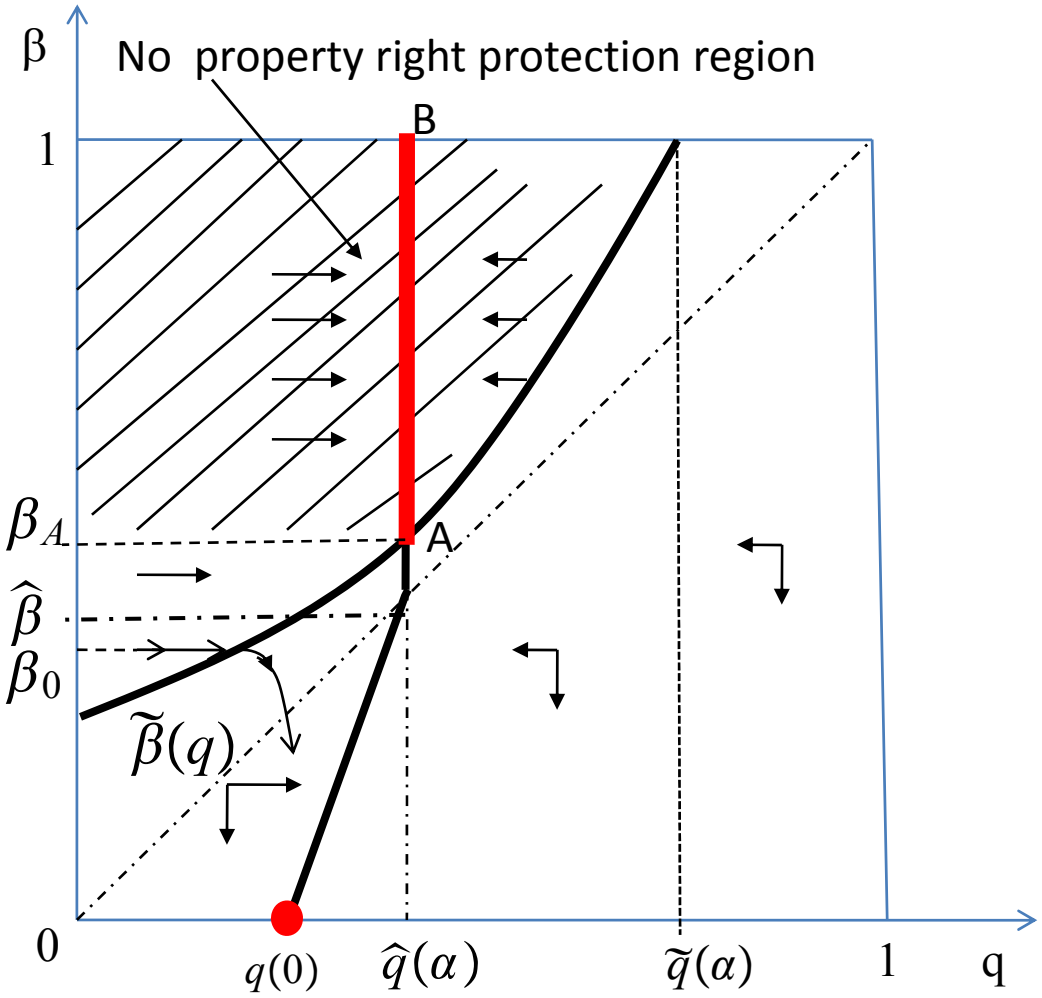


Figure 10: Property rights and conflicts

Joint dynamics (α large enough) $\alpha = \frac{c_2}{c_1} - 1$

Property Rights and Conflict (7)

- Conflict-prone group powerful but relatively small initially:
  no institutional dynamics/no property right protection

- Non Conflict-prone group powerful enough
  property right protection/increasing power to non conflict-prone

  low steady state culture of violence/ high level of protection of property rights

- Hysteresis and non monotonic effects of institutional shocks