



# Accumulated choices, cultural triangle and economic growth

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## ABSTRACT

While the mainstream economics over stresses the roles played by institutions defined as formal rules and organizations, current cultural models tend to be over-subjective, focusing on values system only. We draw from accumulated choices – marginal choices conditional on partial sums of one's own sunken choices as well as that of a chosen group of people – to offer alternative readings into culture, to open up new conversations and to pave the road for unified and balanced growth. National (organizational) cultures are defined as  $\sigma$ -algebras over the collective set of accumulated choices by all the people in the society (organization). To facilitate empirical test, a cultural triangle (also a growth or development triangle) made of wealth, institution and Internal Choice Environment (ICE) is derived. We then examine the interactions among the three dimensions and shed light on some old debates. AC shares dynamic bonds with the path dependence theory but see more positive roles of history.

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## 1. Introduction

It has been more than a century since Max Weber published his milestone piece *The Protestant Ethic and "The Spirit of Capitalism"* (1905), and three decades since Hofstede's *Culture's Consequences* (1980). Despite achievements and progresses, we are still struggling to ascertain cultural impact on economic growth. What has been slowing us down?

**One symptom is an asymmetry in motivation:** while culturists are fully convinced that culture matters, many, if not most, economists are less certain. As a sign, they insist that Weber was a sociologist rather than a political economist. In their seminal paper, *Granato and Inglehart (1996)* also acknowledged considerable resistance to culture as a growth driver. Except a few pieces published over a rather long span of time (e.g., *Barro, 1991; Cole*

*et al., 1992; Fershtman and Weiss, 1993; Mankiw et al., 1992; Gorodnichenko and Roland, 2011*) major economics journals seldom carry articles of this nature. This has limited interdisciplinary dialogs – far below the level we have seen in behavioral economics – despite the vitally important issues involved.

**Mainstream economics has a sin of over-institutionalization** – an almost exclusive focus on institutional forces, which led to an *economics of institutions*. Here institutions are defined broadly, including both organizations and rules by which organizations and behaviors go by, unlike North's demarcation between organizations and institutions (i.e., rules of the game). For example, Keynesianism focuses on governmental intervention policies. The monetary school stresses money supply policies, while neoliberalism is best known for free market doctrine and the price institution that reflects all relevant information.

**Development economists had disruptive models built on institutional forces.** Neoclassic economics predicted per capita income to converge across countries but it failed to materialize. Development economists decided to turn attention from external forces/shocks to what sit inside the economic system. This led to the provocative endogenous growth theory. In the original growth accounting equation (*Solow, 1957*)  $A$  (in addition to  $K$  for capital and  $L$  for labor) was a "catch all" term mainly for technology.

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The endogenous growth models spelt out and tested quite successfully on forces promoting new technology and productivity. The key breakthrough derived from a deviation from the neoclassical assumption of diminishing returns and argued that marginal product of generalized capital is constant, where generalized capital covers both physical and human capitals, the latter includes the result of learning by doing (Romer, 1986) schooling or “studies” (Lucas, 1988).

Endogenous growth models have kept the tradition by seeking institutional – systematic, tangible and ubiquitous – factors like R&D in the growth formulae. This tradition is still very much alive. For example, Bucci and Segre (2011) used human capital and skill acquisition as the proxy for *cultural capital* and found the latter indeed helped retain the long run growth rate of real per-capita income.

**Culturists on the other hand tend to be over-subjective.** The most popular definition of cultures – both at organizational and national levels – is values and their dimensions, of which the best known are the four from Hofstede’s (1980) – individualism versus collectivism, power distance, uncertainty avoidance and masculinity versus femininity – followed by Schwartz’s (1992) layered theory containing both value *contents* (a total of 57 individual values) and *structure* (with 10 values types, which were further organized into two higher dimensions). The value centric definition of culture has been widely accepted, including (at least some) economists (e.g., Gorodnichenko and Roland, 2011).

**Calls for change have arisen from the field.** Nævestad (2009), for example, discussed the problem of ignoring organizational (i.e., institutional) factors with research on safety culture, which led to an inappropriate conceptualization of the relationship between culture, technology and structure in high risk organizations. Williamson and Mathers (2011) not just employed cultural measures by the World Values Surveys but also economic institutions associated with economic freedom and found the latter were more important than values for growth. Relying on value along, especially with a single dimension (e.g., individualism and collectivism) could exaggerate cross cultural difference. Tu (2010) for example found significant difference along the IND-COLL dimension among the Asian Four Little Dragons. New value scales have been brought into the field for modeling culture and growth.

When it comes to culture in relation to economic development, another two measures – achievement motivation and postmodernist values – have been developed and tested (Granato and Inglehart, 1996) in conjunction to a baseline endogenous growth model. The motivation literature grows out of Weber’s original thesis, while the postmodernist value is the inverse of the pro-development spirit in developed countries. The authors created an *achievement motivation index* by summing up the percentage in each country emphasizing autonomy and economic achievement such as “thrift”, “saving money and things”, and “determination” minus the percentage emphasizing conformity to traditional social norms such as “obedience” and “religious faith”. This strategy paid off: together with per capita GDP and educational investment, their model reached an adjusted *R*-square of 0.70 and achievement motivate survived through the final model.

## 2. Culture as accumulated choices

While empirical challenges may still loom large in the *culture – growth* field, conceptual issues are of bigger magnitude and impact. Theories occupy the upper stream of knowledge supply chain and new theories – if done right – can spawn new studies and find alternative points of entry for a new round of copious scholarly findings.

### 2.1. Defining accumulated choices (AC)

**Definition 1.** Let  $f : \mathbb{N}_n \rightarrow A | n \subset \mathbb{N} \wedge A \subset \mathbb{R}$  be a finite and discrete function from  $\mathbb{N}$  to  $A$  such that its domain is a finite subset  $(0, 1, 2, 3, \dots, n)$  of natural or integer numbers  $\mathbb{N}_n$  and its codomain consists of bounded  $(0 \leq \inf\{f(a_n)\} \leq \sup\{(a_n)\} < \infty)$  real values, then the generic term (or the output) of  $f$  defines AC for the  $i$ th individual at  $n$ :

$$f(n) := \left\langle a_n \mid \sum_{\tau=0}^n a_{n-\tau} \right\rangle \tag{1}$$

if  $(\sum_{\tau=0}^n a_{n-\tau} \neq 0)$ .

**Remarks.** Eq. (1) borrows symbols for a *sequence*, which is an ordered list of objects. Like a sequence, *order* matters for AC in two senses. First, the same elements can appear multiple times in a sequence but only unique ones are preserved in a *set*. A sequence has better match with human streams of choices: we all repeat some old choices across lifetime. Second, the order at which choices are made carries important and potentially long consequences due to human memory. For example, choices (imposed or active) in childhood tend to impact entire life much like the first love relationship impacting later ones.

But the resemblance with a sequence stops there. Unlike an arithmetic or geometric sequence, we specifically define  $a_n$  as the choice at occasion  $n$ , where  $n$  is typically a discrete time point that changes from 0 to the end of one’s life. Further, unlike a sequence, ours contains conditional terms of partial sums. More specifically, in Eq. (1) the part  $a_n$  before the vertical line denotes a *marginal* (or current) choice while the part after is the sum of sunken choices, both up to the point  $n$ . Since we are dealing with finite  $(n < \infty)$  stream of choices for an individual sunken choices are known as *partial sums*, similar to a *series* for *infinite* sequences. The partial sums start from zero  $(\tau = n \rightarrow a_{n-\tau} = a_{n-n} = a_0)$  rather than 1, as life starts with (imposed) choices by parents before birth, and ends with life itself. Finally, if we define choice outcomes at each time to be random variables, then it is more convenient to define accumulated choices as stochastic processes. For our purpose here, it suffices to define ACs as in Eq. (1) and (2).

**The key takeaways:** Accumulated choices are *conditional* choices when the partial sums of sunken choices are neither empty nor zero. In contrast, a *singular choice* (SC) is defined as  $\langle a_n \mid \sum_{\tau=0}^n a_{n-\tau} \equiv (a_n)$ , when the partial sums amount to zero either because of an empty set of sunken choices or terms adding up to zero, perhaps due to *additive* or *multiplicative* inverses canceling each other out.

**The contents of partial sums are the key to separate ACs from SCs.** Borrowing from Wu (2008), we define the partial sums to be *double aggregations*: aggregating over time and across people:

$$\left\langle \sum_{\tau=0}^n a_{n-\tau} \right\rangle = f \left( \sum_{\tau=0}^n a_{n-\tau,i} \cup \sum_{\tau=0, j \neq i}^{n_j < n_j} a_{n-\tau,j} \right) \tag{2}$$

This expands the partial sums in Eq. (1) to a function  $f(\cdot)$  of the union of two sets: [1] one’s own past choices all the way up to the beginning of her life  $(a_{n-n=0,i})$ , and [2] the choices made by a group of “significant others” whose number  $(J \ll P)$  presumably is much smaller than  $P$  the entire population. We further assume that the person would not go as far back in time as for her own (i.e.,  $n_j < n$ ) due to limited knowledge on others. Typically, this group is chosen so that they share preferences and choices with the individual, although this is not required for reasons discussed below.

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