

THEORETICAL EXPLANATIONS OF HYBRIDIZATION PROCESS OF GOVERNANCE WITH EVOLUTIONARY GAME, MULTIPLE OPTIMA, AND PATH DEPENDENCE

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Abstract

While a hybrid governance mode has been considered as a transition mode, this consideration has been inappropriate in the current observations of hybrid modes that would be potentially a long-term stable mode. In addition, theoretical explanations of the traditional hybrid mode have lost explanatory powers since convergence ideas and assumptions have been rejected in the international corporate governance. This paper is a first challenge for theoretical explanations of the current emergences of new hybrid modes and hybridizations. While there are four phases of the hybridization, each phase would be discussed based upon evolutionary game theory, concept of multiple optima, and theory of path dependence that consider current drastic changes in international governance caused by mainly market globalizations, IT revolutions, and globalizations of shareholders.

Keywords: corporate governance, hybrid model, concept of multiple optima

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Introduction

Current dynamic global environments have influenced not only business operations widely but also indigenous corporate governance practices. These dynamisms are caused mainly by emergences of international investors, relational investors, and global information networks.²

² See, Hirata,

<http://www.mng.toyo.ac.jp/publication/keieironshu/g200103/02hirata.pdf> (Visited on May 6th, 2003). Pp. 5-6, 11. See also, *Kigyo Housei no Shourai ni kansuru Cyuukan Houkoku*, Nihon Kansayaku Kyoukai Kigyoo Housei Iinkai (March 6, 2000). See, Fukao (1999). Pp.20. See, Monks and Minow (2000). Pp. 250. See also, Bradley et al (1998). Pp.12-13. For discussion about corporate governance reforms and pro-active restructuring on the governance systems, see Pound, (March-April, 1995). Pp.96-98. There is so called new economy generated mainly by IT revolution. Especially, Internet technology has changed fundamental characters of information by speeding up information transactions and increasing accessibility to information. The changing fundamental natures of information have created new business environments by shortening distance among markets, bringing new competitors into existing

In such global dynamisms, institutions such as OECD and ICGN have established global corporate governance principles based upon their observations of current movements in international corporate governance practices.³ One of such movements is hybridization of indigenous governance modes with other local modes. The hybridization has been considered as an effective approach to make the indigenous models effective models in the current dynamisms because the hybridization has been expected to have governance attributes satisfying both the local requirements and the foreign requirements.

markets, and making global competitors severer. See, Dunning, (Spring, 1988). Pp.1-31. See also, Torre and Moxon, (2001). Pp.617-639. See, Brynjolfsson and Hitt, (2000). For more detail discussion on the relational investors, see, Bhagat, Black, and Blair, (Sept, 2002).

³ See, Ad Hoc Task Force on Corporate Governance, *OECD Principles of Corporate Governance*, OECD, (1999). Pp. 3 - 4. ICGN represent mainly the relational investors opinions. See, <http://www.icgn.org/documents/globalcorp.gov.htm>. See also, Monks and Minow (2000). Pp. 256 -258.

Unfortunately, the reports have neither explained the hybridization theoretically nor defined hybrid modes and hybrid models clearly while such empirical studies have reported initial emergences of the hybridizations.⁴

The main reason for the lacking of theoretical discussions is that the hybridizations do not have natures that have been explained based upon convergence assumptions.⁵

Consequently, while there are theories explaining hybridization of corporate governance based upon the assumptions, these conventional theories have not been able to explain the current hybridizations that are not transitions and convergence to other polar governance modes.⁶

In this paper, my main goal is to build initial theoretical frameworks and discussions that could explain the current hybridizations and their processes.

These purely theoretical discussions are based upon multiple equilibria concepts of evolutionary game theory and path dependence.

In addition, to make the discussions clearer, I divided an entire hybridization process into four phases from the destabilization of an indigenous model in the current governance mode to the domination of a hybrid model in a hybrid mode. Discussions are, therefore, made for each phase of the hybridization.

⁴ See, OECD, *Financial Markets and Corporate Governance*, Financial Market Trends V62, (1995). Pp.13-35

⁵ According to Williamson, a hybrid mode emerges when a polar mode can adapt attributes of another polar mode. The five conditions of the adaptation are (1) lower transaction costs due to less required documentation for the adaptation proposals, (2) smaller internal conflicts and disruption through stronger authorities and fiats, (3) strong impacts of information and accessibility and accuracy of the information, (4) emergences of efficient informal organizations, and (5) opportunities for addition incentives. Williamson considers that all attributes of the hybrid mode have intermediate values of the two polar modes' attributes. See, Williamson, (1996), Pp.105. See also, Spekle, (September, 2002).pp.2. See also, Williamson (1996). Pp.103-105. Table 4-1. See also, Subramani and Henderson, (1999).pp.8-9. See, Fujiyoshi (1983). Pp.106. See also, Kanamori et al (1993). Pp.252L.

⁶ See, Hirata, (Visited on May 6th, 2003). Pp.11. See, Esser, (January/February, 2001). Pp.1-2. See, Monks and Minow (2000). Pp. 251-252. The formal convergence argument was also criticized for ignorance of persistence of cultural values and historical events in local models. See, Lu and Batten, (Winter, 2001). Pp.57. Khanna et al (October 2001) pp5-6. See, Rowley and Benson (Winter 2002). Pp.92-94. See, Guillen (January 2000). Pp.9-10. While the quasi convergence will be effective to deal with current dynamic environments in short-term, and hybridization of several models might be more effective in the long run. Similar to the quasi convergence, the functional convergence will be effective in short-term because the functional convergence will have still weak competitive fitness and efficiency. See, Bratton and McCahery (1999).

Phase 1: Destabilization of a Current Equilibrium Model

First phase is a destabilization phase where attributes in current equilibriums are destabilized and liquidated enough to acquire new attributes from other equilibriums. Once the destabilization phase occurs, the current equilibriums are ready to shift towards hybridization processes. Such the destabilization needs significant forces and certain conditions enough to liquidate strong persistence of values, historical events, and the initial conditions in the current equilibrium that had been created by strong hysteresis effects.⁷

Especially, for the destabilizations and liquidations, attributes with the third-degree path dependence are serious obstacles due to extreme strength of the historical persistence and lock-in effects.⁸ However, such persistence is still remedial when powerful abrupt changes enough to make the locked-in elements irrelevant for the new equilibrium occur in the current equilibrium.⁹

Abrupt Changes: A Trigger of the Hybridization Process

The evolutionary game theory uses three equilibriums to explain a shift from a current equilibrium to a new equilibrium. To explain the mechanism of the shift, Aoki uses three equilibrium conditions, P-equilibrium, A-equilibrium, and J-equilibrium.¹⁰ Aoki and Okuno argued that highly stabilized and locked-in equilibriums (A and J equilibriums) could be destabilized enough to shift towards a new equilibrium (P-equilibrium) when historical path dependence of the stabilized equilibrium is removed.

According to Aoki and Okuno, such strong historical persistence of an existing equilibrium could be weakened by abrupt changes and following confusions caused by emergence of new generations who are not constrained by existing traditions and institutions and people who have been highly familiar with foreign cultural values.¹¹ These new generations and people cause severe post abrupt change confusions to keep destabilizing the current equilibrium.

Liquidation of Path Dependence in the Destabilization Phase

While there are three types of path dependence, the second-degree path dependence and the third-degree path dependence are relevant for the destabilization and liquidation phase since attributes and conditions

⁷ Aoki and Okuno use Hysteresis effects and strong historical path dependence instead of the third-degree path dependence. See, Aoki and Okuno, (Visited in 2003).

⁸ See, S. J. Liebowitz, (Visited in 2002).

⁹ See, Liebowitz and Margolis (1999), pp.54.

¹⁰ See, Aoki (2000). Pp.46-47, 50

¹¹ See, Aoki and Okuno, (Visited in 2003).

of the first-degree path dependence are equivalents to the optimum (given) conditions of the efficient market.¹² Consequently, the destabilization is explained through liquidations of the third-degree path dependence to be the second-degree path dependence that is more appropriate conditions for changes and acquisitions of new values and attributes.¹³

Since the third-degree path dependence has been locked in by powerful historical persistence, one needs to explain how the third-degree path dependence is liquidated enough to be the second-degree path dependence in this phase.¹⁴ For the explanation, I define conditions of the liquidation during the abrupt changes and the following confusions.

For the explanations, I take reversal logics of the forming processes of the third-degree path dependence. The reversal logics should be rational since the third-degree path dependence is created and remedied in history and abrupt changes.¹⁵ When one approaches to the reversal logic, one should consider critical components for the formation such as nature of culture, value migration, complementarities, rules, information inefficiency, limits of knowledge, and memory.

First of all, information inefficiency and limits of knowledge always exist even in highly stable equilibriums due to imperfect market conditions and bounded rationality. These conditions sometimes lock in *sub-optimum* conditions strongly enough to make the third-degree path dependence. Consequently, it could be possible to gain more information and knowledge enough to fix the *sub-optimum* conditions when conditions to improve information inefficiency and limits of knowledge emerge in the current equilibrium.¹⁶

¹² This concept is built based upon a discussion of Liebowitz and Margolis (1999), pp.49-58.

¹³ See, S. J. Liebowitz, (Visited in 2002).

¹⁴ Since the third-degree path dependence is still remedial, it is important to find conditions for the liquidation. In addition, the liquidation of the third-degree path dependence is equivalent to the destabilization of the current equilibrium since the current equilibrium is steady when the equilibrium is strongly locked-in by the third-degree path dependence. This implies that the abrupt changes can definitely liquidate the third-degree path dependence enough to be the second-degree path dependence.

See, Aoki and Okuno, (Visited in 2003).

¹⁵ According to Liebowitz and Margolis, persistence of an element becomes the third-degree path dependence after the persistence became the second-degree path dependence once. See, Liebowitz and Margolis (1999). Pp. 4. See also, S. J. Liebowitz, (Visited in 2002).

¹⁶ Liebowitz and Margolitz gave critical discussion for the remediability of the third-degree path dependence. They discussed that the remedial actions are far easier in the public sector since the sector has higher information efficiency in information about externalities. In addition, required collective actions for the remedy are organized more easily in the public sector due to the better information efficiency. This critical discussion implies that improvements in information efficiency are keys for the remedial actions. For more details, see, Liebowitz and Mar-

However, one must notice that the information inefficiency and limitation of knowledge cannot be completely eliminated with any type of infrastructures such as advanced information technologies and global information networks due to inherent limitations in predictabilities in imperfect conditions. This unbalanced information distribution in the inherent information inefficiencies explains processes where some of elements with the third-degree path dependence is liquidated enough to be the second-degree path dependence while the other elements with the same path dependence are not liquidated. Accordingly, it is reasonable to consider that the destabilization of the current equilibrium begins with the liquidation of the third-degree path dependence of *some* attributes.

While the liquidations of the third-degree path dependence are theoretically explained, it is still required to explain how the remedial actions of the path dependence are progressed after the liquidations. Since the path dependences are created by persistence of the initial conditions, historical events, and cultural values, one must clarify changes in these three elements to explain mechanisms of the remedial actions.

Consequently, the discussion about the mechanisms begins with describing how the initial conditions and historical events could release hysteresis effects to certain third-degree path dependence. This discussion is very critical since there have not been clear explanations for unlocking of historical persistence.

Since the initial conditions are starting conditions of following historical events, the initial conditions are bases of all path dependences. Such initial conditions are kept with the following historical events because these have strong impact enough to be retained. This implies that these can be forgotten if the strong impacts are becoming weak. This logic is applied to explain how the third-degree path dependence can be liquidated since the third-degree path dependence is mainly created by strong impacts from these initial conditions and historical events.

I try to explain with the forgetting curve showing the decline of retention of memory in time.¹⁷ The reason for the application of forgetting curve is that the curve assumes eternity of memories of historical events while the curve clearly explains how such memories could be forgotten as if the memories are gone. This reason is mathematically expressed by an equation of forgetting curve.¹⁸

golits (1999), pp. 54-55. See, Williamson, (1996), Pp.240-241. See, Williamson, (1993), pp.107-156. See, Aoki, (2000). See also, Aoki and Okuno, (Visited in 2003).

¹⁷ See, *Forgetting Curve* at http://www.wikipedia.org/wiki/Forgetting_curve (Visited in 2003).

¹⁸ While R of the initial conditions and the historical events becomes weak enough to liquidate their third-degree path dependences, such initial conditions and historical events are not *eliminated* at all. As the forgetting curve equation

The mathematical expression of the forgetting curve is $R = e^{-t/S}$. Here, R is memory retention, S is relative strength of memory, and t is time. Consequently, based upon this model, levels of the memory retentions are expressed as a balance of time and the relative strength of memory. Since time (t) causes negative multiplier effects, the memory retention is weakened significantly as time goes by. On the other hand, the retention is strengthened significantly if impacts of historical events are significant since the relative strength of memory (S) causes positive multiplier effects.¹⁹

If a stable condition has a historical event with certain memory retention, the historical event has its own path dependence based upon a level of the retention. Since the balance of relative strength of t and S defines a level of R , there would be two different situations. One is a situation that R is very strong and the other is a situation that R is very weak.

The first situation is explained by following two scenarios. One scenario is that S is stronger than t because S is continuously and repeatedly strengthened in history. In this scenario, R is always very strong regardless of t . Another scenario is that S is stronger than t regardless of the relative power balance of t and S because of current strong impacts. In this scenario, R is very strong as long as the temporary impact is maintained. This condition is also described as *booming*.

The second situation is explained by following three scenarios. First scenario is that t is stronger than S because of a normal time lapse. In other word, R is very weak as a thing (e) became a *relic*. Second one is that S became very weak because impacts were lost or weakened greatly. This is happening because no new impact on e has emerged. Third one is that S has been originally very weak. This means that e is not even memorized at the point of its event.²⁰

The abrupt changes weaken R of existing element of the third-degree path dependence with new significant impacts from the changes and following confusions. Such significant impact not only weak-

shows, t and S for e must not be zero as long as R exists. Once S occurs, S cannot completely eliminate because S became a *history*. In addition, no one can bring t back to zero. This clearly explains that R can be quite close to zero ($R \approx 0$) but it cannot be zero ($R = 0$). Based upon this explanation, one can explain how liquidations of the third-degree path dependences of both the initial condition and the historical events are feasible.

¹⁹ The forgetting curve is an illustration of the decline of memory retention in time. Similar concept is the strength of memory explaining memory retention in the brain. According to the forgetting curve concept, one can remember certain memories in long-terms if the memories have strong impacts. A typical forgetting curve shows that one tends to halve its memory of newly learned knowledge in a matter of time without conscious reviews of the acquired knowledge. See, *Forgetting Curve*, (Visited in 2003).

²⁰ See, *Memory* at <http://www.wikipedia.org/wiki/Memory> (Visited in 2003).

ens S of e but also accelerate t of e . As a result, e will quickly become outdated and new impacts of e are not significant enough to exceed the new impacts. Then, the accelerated forgetting curve indicates that R is also becoming very weak quickly.

Cultural values have been considered as “the mother of all path dependence” and such values are gradually generated and strengthened in insignificant historical events beginning at the initial conditions.²¹ Such cultural dependence based upon the cultural values is usually locked in strongly enough to form the third-degree path dependence. While such strong cultural values have been considered as black boxes in international business due to their complexities and persistence, the forgetting curve model is also highly effective to explain the liquidation mechanism of the cultural dependence.²²

While the forgetting curve model is effective, additional elements are used to explain the liquidation mechanisms of the cultural persistence. Within such elements, learning, sharing, and adaptability of culture are seemed to be critical to explain the mechanism.²³ Based upon the three natures, the cultural values are characterized as follows. The cultural values can be acquired through learning and experience. Such newly acquired cultural values can be shared with members of a certain community. Such shared values can be adapted into the community as changes or implementations.

With the forgetting curve concept, the three unique elements of cultures give great explanatory power to a discussion of the liquidation based upon evolutionary game theory and path dependence because the required conditions for learning, sharing, and adaptation are the same for liquidations of historical dependence. Consequently, the cultural values can learn, share, and adapt new values when information inefficiency and limits of knowledge are significantly improved in the abrupt changes and following confusions.²⁴

Consequently, liquidations of the cultural dependences could be accelerated more than liquida-

²¹ See, Licht, (2001).

²² In addition, the forgetting curve explains that the cultural values are not eliminated completely because R of the cultural value can be quite close to zero ($R \approx 0$) but it cannot be zero ($R = 0$). See, *Forgetting Curve*, (Visited in 2003). Licht discussed, “national culture will not go away anytime soon.” While Licht did not clearly mentioned about the immortality of the cultural values, his argument supports the immortality since he discussed that the old cultural values are not completely eliminated but adjusted and adapted into new global cultures. See, Licht, (2001). pp.201-204

²³ See, Hodgetts and Luthans, (2000). Pp. 108-109.

²⁴ Such active acquisitions and adaptations have been clearly described in Slywotzky’s value migration model. In Slywotzky’s model, the cultural values and cultural path dependence are liquidated in “the value inflow” phase that is a process of the learning of new cultural values. This inflow is caused by absolute superiority of attributes in different equilibriums. See, Modis (1998). Pp. 53-55.

tions of historical dependences because cultural values are liquidated by not only levels of memory retentions but also active acquisitions and adaptations of new values. This is clearly following the reversal logic of the formation of path dependence. The liquidations of the cultural dependences lead the liquidations of the historical dependences that were formed before the cultural dependences were formed.²⁵

While liquidation mechanisms of three constituencies forming historical and cultural dependences have been discussed, corporate governance has had one external constituency of the dependences. Since corporate governance practices have been subjects for legal restrictions and controls, complementarities of governance have strengthened the path dependence of governance with the three inherent constituencies of the dependences.²⁶

The liquidations of the path dependences of the complementarities are caused by deregulations and new legal structures around corporate governance practices to deal with the abrupt changes and following confusions in the current equilibrium. Since these liquidations mean extinctions of the rule driven sources of the dependences, the liquidations of the complementarities' path dependences powerfully facilitate liquidating the path dependence of the governance. This argument is quite clear if one notices that the rule driven sources are exactly the complementarities such as laws and regulations for the governance practices, therefore, regulatory institutions.²⁷

Phase 2: Level I Hybridization

Second phase is a level I hybridization phase creating a hybrid mode as a new dimension of governance mode. The second phase explains how the hybrid mode can stay as a new equilibrium. After current equilibriums and persistence of indigenous governance attributes have been destabilized and liquidated in the first phase, such liquidated attributes start moving towards different equilibriums through

learning and acquiring new values of the different equilibriums. This process is called as level I hybridization here. While this movement is quite similar to Williamson's transition process, this is completely different process because fundamental forces of this movement are based upon neither convergence philosophies nor Williamson's hybridization concept.²⁸

At the end of the level I hybridization, there will be dominant hybrid modes that have strong persistence of their attributes enough to make themselves new stable modes in long-term. While functional convergence modes might emerge at the beginning of the hybridization, such short-lived convergence models are quickly replaced by several *potentially dominant* hybrid modes.²⁹ This replacement is caused by both current dynamic environments and conditions created in the first phase.

Conceptual Framework of Level I Hybridization

According to Aoki, system transformations begin once historical dependence of a current equilibrium is weakened significantly by the full destabilization of the equilibrium. The transformation of the current equilibrium goes initially towards sub-equilibrium condition that is a temporally stabilized new equilibrium until the sub-equilibrium is fully stabilized by own persistence.³⁰ In the evolutionary game theory, Aoki called such sub-equilibrium as the sub-pareto-optimum equilibrium (Sub-P-Equilibrium). Aoki called the fully stabilized sub-P-equilibrium as pareto-optimum equilibrium (P-equilibrium).³¹

Level I hybridization is not a transition process based upon convergence concepts because sub-P-Equilibrium will be path dependent in level I hybridization enough to reject re-transformation to another polar modes. While such persistence is caused initially by the conditions of the first phase, the dependence of sub-P-equilibrium is strengthened in entire period of level I hybridization where initial substitutions and emergences of hybrid modes creating the initial conditions and persistence of sub-P-equilibrium exist. As I will discuss as level II hybridization later, such persistence of sub-P-equilibrium is locked-in during the stochastic process to be P-equilibrium.³²

²⁵ See, Shann, (Oct, 1997).

²⁶ This is because corporate governances are subjects to be regulated and controlled by regulations, laws, and regulatory institutions that have been path dependent. Historical events in different nations have had significant influences to governance models since complementarities around the models would be established based upon such historical experiences. See, Khanna, Kogan, and Palepu, (October 30, 2001). Heinrich mentioned the importance of the complementarities for the governance models as follows. "In order to succeed, reform of corporate governance systems must take into account complementarities among governance instruments and between governance instruments on the one hand and the institutional and regulatory environment on the other hand. As a result, corporate governance reforms must be comprehensive rather than piecemeal." See, Heinrich, (September 1999). pp. 4. See also, Bebchuk and Roe, (November, 1999), pp.11. See also, Guillen, (January, 2000).

²⁷ See, Bebchuk and Roe, (November, 1999), pp. 8-13.

²⁸ See, Williamson, (1996), pp.101-105 and table 4.1 on pp. 105.

²⁹ See, Bratton and McCahery (1999). Gilson stated, "Functional convergence is likely the first response to competitive pressure because changing the form of existing institutions is costly." See, Gilson (2001).

³⁰ See, Aoki (2000). Pp. 50-51.

³¹ The Sub-P-Equilibrium tends to be "steady condition" until P-equilibrium emerges. This means that, as Aoki mentioned, the Sub-P-Equilibrium can be steady in long run if the P-equilibrium cannot emerge easily.

³² One can see the Sub-P-equilibrium as a quasi-equilibrium condition since the Sub-P-equilibrium is an

Obviously, level I hybridization is neither a simple remedial process nor a contingency process. While level I hybridization facilitates remedial movements of the path dependences through learning and adaptation of new values and attributes of polar mode, level I hybridization should be considered as a transformation process of the current mode to a new [dominant] hybrid mode.

Needless to say, level I hybridization does not follow transition process of convergence concepts. While the convergence process has to transit to certain existing modes due to disabilities to maintain original attributes after the acquisition of new attributes from different modes, level I hybridization allows maintaining both the original attributes and the acquired attributes to create new modes. This is because the hybrid mode could control levels of path dependences of old attributes and new attributes between the first phase and the second phase of hybridization.

Mechanisms of Transformations of Attributes with Historical Dependence

As I have just mentioned, the hybrid mode could control levels of path dependences of old attributes and new attributes. To explain this characteristic, I use the forgetting curve model because the transformations occur in process dynamism of recording and oblivion processes between the two first phases.

First, in the very beginning of level I hybridization, the transformations begin by forgetting old historical memories (values). These processes of oblivion lead to the second-degree path dependence that can record new information and conditions to create new memories. In other word, the new second-degree path dependence will be the initial condition where new historical events are institutionalized to create the new third-degree path dependence in sub-P-equilibrium. While these processes are similar to reversal processes, these are not simple reversal processes because the new second-degree path dependence is completely new and the foundation for new third-degree path dependence.³³

The non-liquidated third-degree path dependence remains as the third-degree path dependence throughout level I hybridization unless the third-degree path dependence transforms itself to the first-degree path dependence. Main reasons for these illiquidities are (1) absolute information inefficiency and limits of knowledge and (2) absolute power of memory retentions creating invariabilities in certain equilibrium. Consequently, the non-liquidated third-

degree path dependence becomes the initial condition of sub-P-equilibrium, too.

In addition to these two scenarios, there is one more situation called as semi-liquidations of the third-degree path dependence. The semi-liquidation is a liquidation that does not transform to the second-degree path dependence while it liquidates historical persistence enough to change strong attributes to semi-strong ones.

This situation emerges when impacts on e that is creating new memories as new S during the destabilizations of current equilibriums are not strong enough to weaken current S , therefore, current R of the third-degree path dependence. In addition, this situation could make R of the current third-degree path dependence insensitive to lapses of time because the destabilization could balance the old S and the new S on e . Such semi-liquidated third-degree path dependence could only learn and adapt new values as additional information to the current values. Consequently, such semi-liquidated third-degree path dependence becomes the initial conditions of sub-P-equilibrium.

As I have discussed, while there are three different scenarios of liquidations of historical dependence and the initial conditions of the third-degree path dependence, all the three different scenarios coexist in level I hybridization to create new initial conditions of sub-P-equilibrium. Consequently, the initial conditions of sub-P-equilibrium are mixtures of new third-degree path dependence, unchanged third-degree path dependence, and new third-degree path dependence based upon old values.

Changes of Complementarities in Level I Hybridization

As I already discussed, complementarities are critical for hybridization of corporate governance. In level I hybridization, such complementarities are liquidated and removed gradually. These processes are called as deregulations or liberalizations. After the liquidations, new complementarities are placed. Since the complementarities are path dependent and have strengthened persistence of governance attributes, removals of the complementarities in advance of the completion of level I hybridization would accelerate the hybridization.

After the new complementarities are placed, the new complementarities would accelerated level I hybridization because the complementarities become the initial conditions of the hybrid mode by being the rule-driven sources of path dependence of the hybrid governance modes.³⁴

According to discussions of Lucian and Roe, the complementarities could be the initial conditions not only by being the rule-driven sources but also by

infant condition of the P-equilibrium condition (full-equilibrium).

³³ This is quite logical explanation since conditions of information and knowledge must be far better than old conditions, otherwise, liquidation of the third-degree path dependence never happen.

³⁴ The complementarities become such sources since the complementarities are sources of new rules, regulations, and authorities of the new mode.

being the structure-driven sources of path dependence.³⁵ During the level I hybridization process, complementarities are liquidated and changed enough to define initial ownership structures of a hybrid mode. This tends to be happening especially in the current environments because of the globalizations of shareholders and emergences of new types of shareholders.³⁶

Mechanisms of Transformations of Attributes with Cultural Dependence

As I discussed, cultural values are destabilized and liquidated in the first phase. Once the values are destabilized and liquidated, attributes with such cultural dependences are also liquidated. When such liquidations of the cultural dependences are strong, the attributes begin learning and acquiring new values during level I hybridization. Such movements are explained by the fundamental characteristics of cultures as I already discussed.³⁷

At the beginning of the level I hybridization, new values inflow in better information conditions. By accepting such new values, old culture starts shifting to the second-degree path dependence. At the same time, such new values are getting stabilized due to their impacts. This value stabilization is a process of selection of cultural values to be retained in the new equilibrium.³⁸ By this point, cultural val-

ues have the second-degree path dependence.³⁹ After the stabilization phase, the value outflow phase begins. In this phase, the new cultural values with the new second-degree path dependence start forgetting obsolete values quickly. At the end of this phase, the new cultural values will be the initial conditions of sub-P-equilibrium with the non-liquidated cultural values.⁴⁰

Substitution Mechanisms towards Hybrid Modes in Level I Hybridization

While I have discussed mechanisms of liquidations of attributes of the third-degree path dependence and the following transformations, it is critical to discuss substitution mechanisms from the current mode to the hybrid mode in level I hybridization.

Such substitution is explained by a concept of substitution process based upon the remediability of the third-degree path dependence of a certain mode.⁴¹ While the remediability has been also the foundation of the previous discussion, Liebowitz and Margolis used the remediability to create the concept of substitution from a mode to another mode after liquidations of the third-degree path dependence.

According to Liebowitz and Margolis, when the third-degree path dependence is liquidated, the third-degree path dependence moves to be the second-degree path dependence that can acquire new information. In this situation, the second-degree path dependence facilitates switching from a current mode to a new mode through a process of learning and adaptation of new values. The switching will be completed once the second-degree path dependence has learned and adapted values and historical events enough to transform itself to the third-degree path dependence in the new mode.⁴²

³⁵ "Complementarities are similar to sunk adaptive costs, but they concern adaptations not by the firm whose ownership structure is under consideration but rather by other entities and institutions." "The corporate ownership structures that a country had earlier at T0 determined what accompanying institutions, practices, and skills were developed. And these aspects of the corporate environment might in turn influence what structures would be efficient later at T1." See, Bebchuk and Roe, (November, 1999), pp. 11.

³⁶ However, the structure-driven resource cannot be completely eliminated because the structure-driven resources are highly depending on the initial conditions and initial structures. The initial conditions and structures will not be eliminated because these are historical facts. In addition, such initial conditions are extremely reflection the basic cultural values in general.

³⁷ Based upon Slywotzky's value migration model, the learning and sharing processes of new values complete at the end of the process, namely. One complete set of the Slywotzky's value migration is made by the value inflow phase, the stabilization phase, and the value outflow phase. See, Modis (1998). Pp. 53-55

³⁸ Turnbull explained that cultural differences may support cultural changes once unite recognition exists and consensus is made in a certain area. Turnbull's discussion implies that different cultural values are adapted in certain cultural values when social adaptabilities of the new cultural values are kept high levels through such recognition and consensus. See, Turnbull, Corporate Governance: Its Scope, Concerns & Theories, Corporate Governance: An International Review Vol5 N4 pp. 180-205, Blackwood Oxford, (Oct, 1997).

³⁹ Similar to the initial conditions and historical events, some of the existing cultural values will be remaining as the third-degree path dependence while the remaining third-degree path dependence will be the semi-strong modes.

⁴⁰ See, McDonnell, Brett H. (2002). Convergence in Corporate Governance – Possible, But Not Desirable. Villanova Law Review, Villanova University.

⁴¹ See, Liebowitz and Margolis (1999).

⁴² The third-degree path dependence of a model will be changed to the second-degree path dependence to be the third-degree path dependence of a new model. This process is one of remediabilities of the third-degree path dependence. This concept of substitution could be refined by mechanisms of substitutions based on switching costs and net values of modes. According to the mechanisms, the substitution occurs either when switching costs from the old model to the new model is very low or when net value of the new model is far larger than the net value of the old model. As Aoki implies that the social conditions tend to shift to the long-term stable P-equilibrium if P-equilibrium has the highest probability and the lowest switching costs in the limited probability. See, "cost of transition" of Aoki (2000). Pp. 55. Liebowitz and Margolis used this idea based upon switching costs and net value of a model.

Attributes of Hybrid Modes at the End of Level I Hybridization

While Williamson argued that all attributes of a hybrid mode would be held as semi-strong modes, these arguments must be reconsidered carefully since Williamson's discussions were based upon convergence concepts. There are two points making my discussions here different from Williamson's arguments. One is the persistence of all attributes and memories stabilizing sub-P-equilibrium at the end of level I hybridization. The other is persistence of attributes with sub-liquidated third-degree path dependences.

The persistence of all attributes have been strengthened in the first phase and level I hybridization since these phases are historical. When the third-degree path dependence is destabilized and liquidated enough to change itself to the second-degree path dependence, the attributes with such path dependence have acquired new historical dependence. During the learning and adaptation processes in level I hybridization, the attributes have also acquired another historical dependence to retransform itself to the third-degree path dependence. Even if the third-degree path dependence is unchangeable or liquidated partially (sub-liquidation), the path dependence is influenced in the history.

In addition to these arguments, eternity of historical facts and cultural values in attributes explain strong persistence enough to reject Williamson's concept of hybrid modes as transition modes to certain polar modes. As I discussed already, forgetting curve model has proven the eternity of memories in attributes.

The persistence of attributes with sub-liquidated third-degree path dependences can differentiate power modes of the attributes of the hybrid mode. This argument is based upon unbalanced levels of old values in each attributes of the hybrid mode. For example, power modes would be semi-strong for new attributes acquired by the second-degree path dependence that was transformed from the third-degree path dependence in the beginning of the level I hybridization. The power modes would be stronger than semi-strong for attributes with sub-liquidated third-degree path dependence. The power modes would be strong for attributes with unchangeable path dependence.

Consequently, a hybrid mode emerged as a dominant mode at the end of level I hybridization tends to have different levels of power modes of new

Their discussions are very meaningful since they discussed such costs and net values to explain how locked-in effects are unlocked. See, Liebowitz and Margolis (1999), Pp.54-55, Figure 5.1 on Pp.93. and Figure 5.2 on Pp.94, Figure 5.3 on Pp.95., and Figure 5.6 on Pp.101, and pp.109-111. When return from the substitution is expected far larger than the switching costs, the relative switching costs will be very low. See also, Williamson (1996). Pp.240-241. See also, Williamson, (1993). Pp. 107-156.

attributes because levels of the differentiation are varied due to unbalanced levels of different types of attributes. While there are multiple models to show the power modes based on the different levels of liquidations of three different types of path dependence here, it is important to notice that the power modes would be distributed between semi-strong modes and strong modes. This notification contributes to model the attributes in the hybrid mode.⁴³

Phase 3: Level II Hybridization

Third phase is called as a level II hybridization where a dominant hybrid model emerges at the end of a stochastic process. At the end of level I hybridization, sub-P-equilibrium emerges with a dominant hybrid mode. Once sub-P-equilibrium has emerged, several hybrid models start emerging in a stochastic process until a dominant hybrid model emerged at the end of the stochastic process. Once the stochastic process ends, sub-P-equilibrium would be P-equilibrium. Such a substitution process of hybrid models until the dominant hybrid model's emergence is called as level II hybridization. In other word, level II hybridization is a process of transformation from sub-P-equilibrium to P-equilibrium.⁴⁴

While level II hybridization creates a dominant hybrid model, no one can predict the dominant hybrid model until the model actually merges at the end of a stochastic process because of multiple optima and unpredictability of an optimum output during the stochastic process.⁴⁵ Due to such unpredictability with multiple optima in the stochastic process, it is impossible to rationalize mechanisms of substitutions and interactions in the process. The only way to discuss level II hybridization is to argue possible conditions that a dominant hybrid model at the end of the process should have.

Pareto-optimum Equilibrium at the end of Level II Hybridization

Level II hybridization begins when sub-P-equilibrium is completely stabilized and ends when P-equilibrium is completely stabilized. In other word, level II hybridization is a process of transformation of sub-P-equilibrium to P-equilibrium.

In the process, there is the stochastic process that creates a dominant hybrid model. Consequently, level II hybridization generates both P-equilibrium

⁴³ While Fleming has not ensured efficacy and efficiency of the hybrid mode, Fleming clearly observed and ensured a hybrid mode having semi-strong attributes of the two different models. See, Fleming, (Nov-Dec, 1998).

⁴⁴ See, Aoki (2000), fig 4 on pp.51.

⁴⁵ In addition, the dominant model still emerged as *sub-optimum* even if the output is a result of the stochastic process because the stochastic process will always have information inefficiency and limits of knowledge. See, Liebowitz, (Visited in 2002). See also, Liebowitz and Margolis (1999).

and a dominant hybrid model at the ends of the hybridization process.

According to the evolutionary game theory that argues both mechanisms of stabilization of P-equilibrium and concept of P-equilibrium, P-equilibrium is described as a long-term stable equilibrium.

Additionally, P-equilibrium is also considered as a hybrid equilibrium that has attributes of two polar equilibriums.

While sub-P-equilibrium is also a hybridized mode, differences between sub-P-equilibrium and P-equilibrium are caused by levels of hysteresis effects of the equilibriums. This implies that P-equilibrium has higher levels of the hysteresis effects than those of sub-P-equilibrium. Such higher levels of the effects could be generated in stochastic process because the stochastic process creates historical dependence and lock-in effects through substitutions of different hybrid models.

Consequently, while a certain hybrid mode becomes dominant at the stabilization of sub-P-equilibrium, the emergence of a dominant hybrid model has to wait for the stabilization of P-equilibrium.⁴⁶

Movements and Conditions of Path Dependence in Level II Hybridization

It is obvious that Aoki's model of evolutionary game equilibria supports the first three phases of hybridization processes. While I have discussed mecha-

nisms of liquidations and re-stabilizations of path dependence of attributes in the first two phases, I have not argued such mechanisms in the stochastic process in level II hybridization. In this section, I discuss the mechanisms of liquidations and re-stabilizations of path dependence of attributes with historical values and cultural values in level II hybridization process.

At the beginning of level II hybridization, path dependence of attributes of the dominant hybrid mode is stabilized enough to stabilize sub-P-equilibrium. Such attributes are the initial conditions for hybrid models. Naturally, new complementarities are also initial conditions for the models. In these situations, instead of path dependence in the dominant hybrid mode, path dependence of hybrid models is subject for process of liquidations and re-stabilizations. The path dependence of hybrid models is influenced by historical paths and conditions of information efficiency and bounded rationalities in the stochastic process. Consequently, while all hybrid models have attributes of the hybrid mode as the initial conditions, liquidations and re-stabilizations of path dependence of attributes of the hybrid mode will be differentiated in each hybrid model by different historical paths and information conditions of the models. While there are different levels of path dependence of the models, mechanisms of liquidations and re-stabilizations of path dependence creating such differentiations among the models are identical to mechanisms of liquidations and re-stabilizations of path dependence in level I hybridization. Namely, the initial path dependence of each attribute can be liquidated enough to be the second-degree path dependence in the stochastic process while some initial dependence could be maintained throughout the process. Cultural persistence in the attributes would be same for all hybrid models at the beginning of level II hybridization because the hybrid mode has the cultural persistence of the attributes as the initial conditions. As I discussed for level I hybridization, this is because sub-P-equilibrium includes both unchangeable third-degree path dependence and sub-liquidated third-degree path dependence.

Similar to the initial conditions and historical dependence, each hybrid model begins liquidate the initial cultural path dependence of the attributes and re-stabilize new cultural dependence of the attributes in the stochastic process. This differentiation process has been discussed intensively in level I hybridization by forgetting curve model and Slywotzky's value migration model. While I discussed how each hybrid model acquires different path dependence in the stochastic process and why such differences occur in the process, I cannot rationalize conditions of path dependence of a dominant hybrid model due to the multiple optima and the unpredictability in the stochastic process. However, it is obvious that the dominant hybrid model has all attributes required in the hybrid mode even if conditions of path depend-

⁴⁶ Evolution of such P-equilibrium begins by destabilizations and liquidations of a polar equilibrium and ends by stabilization of P-equilibrium. In the evolution process, there is sub-P-equilibrium as a temporary equilibrium. See, Aoki (2000). Pp. 50. See also, Aoki and Okuno, (Visited in 2003). Aoki explained the transition from the Sub-P-equilibrium to the P-equilibrium based upon the evolutionary game equilibria models. With these models, Aoki clearly showed how a stabilized equilibrium (A or J) moves towards P-equilibrium via sub-P-equilibrium. See, Aoki (2000). Figure 4 (a) and (b) on Pp. 51-52. According to Aoki's model of evolutionary game equilibria, a polar equilibrium called as J-equilibrium is destabilized by abrupt changes enough to transform itself to P-equilibrium. While the polar equilibrium moves towards P-equilibrium, such transformation takes time. Consequently, there would be a transition mode to P-equilibrium during the long transformation process. Aoki called the transition equilibrium as sub-P-equilibrium or JP. Since transformation of J-equilibrium to sub-P-equilibrium tends to take more time than transformation of sub-P-equilibrium to P-equilibrium, sub-P-equilibrium tends to be hybrid and acquires historical dependence. Such sub-P-equilibrium would be path dependent enough maintain hybrid condition towards P-equilibrium. During a process of transformation of sub-P-equilibrium to P-equilibrium, additional historical dependence is acquired enough to stabilize P-equilibrium enough to be a long-term equilibrium. See, Aoki (2000), pp. 51-53. See also, Aoki and Okuno, (Visited in 2003). See, Modis (1998). Pp. 10-26, Pp. 29-42, Pp. 46-50, Pp. 83-87, and Appendix A on Pp. 169-172.

ence of each attribute have been different from the initial conditions.

Mechanisms of Domination of a Hybrid Model

As I stated, at the end of the stochastic process, a dominant hybrid model emerges as results of continuous substitutions in the process. While no one can predict what the dominant hybrid model will be due to the unpredictability, it is important to see domination mechanisms of a hybrid model.

complementarities. While the dominant hybrid model emerges at X after substitutions in the stochastic process, the actual substitution in markets will not occur until the model hits X'. This is because of non-recognition in the markets. While the recognition in the markets begins at X', the network effects in the markets based upon higher levels of recognition have to wait until the dominant model penetrates the markets by X' %.

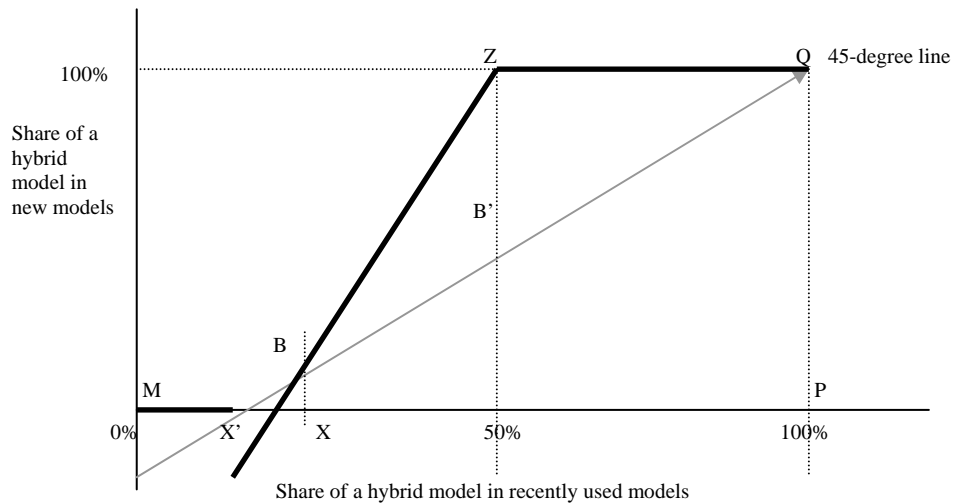


Fig 1. Shares of a hybrid model and dominance

Such dominance of a hybrid model is influenced by both share of the model in another models and penetration of the model in sub-P-equilibrium. Figure 1 shows relationship between shares and dominance of a hybrid model. Y-axis shows growth of share of a hybrid model among other hybrid models. X-axis shows accumulated share of the hybrid model in a niche. Since 45-degree diagonal line indicates optimum points, B' on the diagonal line (50% of accumulated share) is an optimum substitution point. B on the diagonal line is, consequently, accelerated substitution point (X% of the total accumulated share). A dominant hybrid model emerges at X' % of the total accumulated share.⁴⁷

The figure 1 explains how shares relate to the substitution that produces a dominant hybrid model. In other word, such the share relate to emergence of P-equilibrium since P-equilibrium begins with the emergence of a dominant hybrid model. From M to X, an expected dominant hybrid model exists in the stochastic process while nobody can predict a dominant hybrid model due to the nature of the stochastic process. At X, a dominant hybrid model emerges because of the strong path dependences and other

⁴⁷ As I showed in figure 4, X' will be around 7% while X will be between 7 and 18%.

Once the accumulated share of the dominant model occupies X' %, actual growth begins. Once the accumulated share occupies X %, the growth hits a point B where is the actual market substitution point. Then, accelerated growth begins by the network effects and multiplier effects.

All attributes of hybrid modes are stabilized at X so that the dominant hybrid model owns the attributes. This is important since at the beginning of sub-P-equilibrium, these attributes were just acquired but not fully stabilized. Then, at the beginning of the P-equilibrium, these attributes are fully stabilized in semi-strong modes.

Phase 4: Stabilization of the New Equilibrium

The fourth phase is a stabilization of the new equilibrium that is consisted of a dominant hybrid mode and

a dominant hybrid model. In this phase, the new equilibrium is continuously strengthened by both hysteresis effects and multiplier effects.

After the point B on figure 2, the multiplier effects that strengthen locked-in effects of persistence enough to stabilize P-equilibrium and establish concrete dominance of the hybrid model. This process begins at B and completes at Z because the market (a niche) is filled by the dominant hybrid model at Z.

There are three reasons for the growth acceleration after B'. First reason is the network effects caused by higher levels of recognition of the model. Second reason is a completion of implementations of new complementarities at B'. The third reason is accelerated advantages of the hybrid model's attributes because of historical events and cultural values in the multiplier effect.

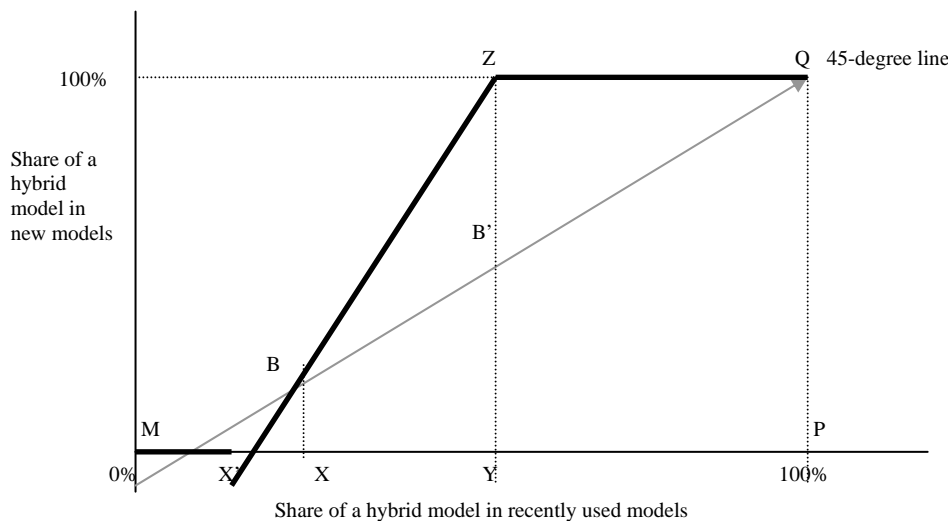


Fig 2. Shares of a hybrid model and life expectancy

Summary

The current hybridization would continue to make a long-term stable hybrid mode as a new governance mode by gradually changing conditions of path dependences and equilibriums. There are three critical points in the entire hybridization process: (1) remediability of the third-degree path dependence, (2) natures of substitutions, and (3) evolutionary processes of transformations to pareto-equilibrium. These elements are critical not only because the elements give higher rationalities to the discussions but also because the elements respect inevitabilities of the current emergences of hybridizations.

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