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Task Ambiguity and Firm Productivity in Hybrid Work: A Multi-Task Principal-Agent Approach

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ABSTRACT

The widespread adoption of hybrid work models necessitates a reevaluation of the economic concepts governing intra-firm contracts and job design. This study examines the impact of task ambiguity on organizational productivity using a conceptual framework that integrates personnel economics, principal-agent theory, incomplete contract theory, and decision-making under uncertainty. Four principal mechanisms clarify the impact of task ambiguity on productivity: information search expenses, decision-making delays, ex-post renegotiation expenses, and effective effort expenditures. The analysis uses a revised multi-task principal-agent model in the Holmström–Milgrom tradition, in which task ambiguity is introduced as a parameter (τ) in the agent's effort cost function. The model shows that task ambiguity raises the marginal cost of effort and thereby lowers the optimal incentive intensity; formally, τ enters the optimal contract in a manner observationally equivalent to an increase in the effective noise level to $\sigma^2(1+\tau)$. Task ambiguity thus operates as a risk-equivalent factor, reducing the effort allocated to unobservable tasks and weakening the effectiveness of incentive-based compensation systems. Numerical simulations demonstrate that increased task ambiguity non-linearly reduces the equilibrium effort level, with effort declining by around 83% as the τ parameter rises from 0 to 2. As an interpretive extension of the model rather than a formal derivation, the study further argues - drawing on institutional evidence on the relative incompleteness of

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employment contracts in Turkey - that such conditions correspond to a higher initial level of task ambiguity, so the productivity losses identified by the model are likely to be amplified in the Turkish labor market. On this basis, a three-tiered policy framework for intra-firm contract design is proposed.

Keywords: labor economics, hybrid work, productivity

Ö Z

Hibrit çalışma modellerinin yaygınlaşması, firma içi sözleşmelerin ve iş tasarımı ekonomik temellerinin yeniden değerlendirilmesini gerekli kılmaktadır. Bu çalışma, görev belirsizliğinin firma üretkenliği üzerindeki etkisini; Personnel Economics, Principal-Agent Theory, eksik sözleşme teorisi ve belirsizlik altında karar verme yaklaşımını bütünleştiren kavramsal bir çerçeve aracılığıyla incelemektedir. Buna göre, görev belirsizliğinin üretkenlik üzerindeki etkisi dört temel mekanizma üzerinden açıklanmaktadır: bilgi arama maliyetleri, karar gecikmeleri, ex-post yeniden müzakere maliyetleri ve efektif çaba maliyetleri. Analiz, Holmström–Milgrom geleneğindeki çoklu görev asil-vekil modelinin, görev belirsizliğinin vekilin çaba maliyeti fonksiyonuna bir parametre (τ) olarak dahil edildiği uyarlanmış bir versiyonu ile desteklenmektedir. Model, görev belirsizliğinin çabanın marjinal maliyetini yükselttiğini ve bu yolla optimal teşvik yoğunluğunu düşürdüğünü göstermektedir; τ , optimal sözleşmeye etkin gürültü düzeyinin $\sigma^2(1+\tau)$ biçiminde artmasına gözlemsel olarak eşdeğer bir biçimde girmekte ve bu yönüyle risk-eşdeğeri bir faktör olarak işlemektedir. Görev belirsizliği böylece gözlemlenemeyen görevlere ayrılan çabayı azaltmakta ve teşvik temelli ücretlendirme mekanizmalarının etkinliğini zayıflatmaktadır. Sayısal simülasyonlar, görev belirsizliğindeki artışların denge çaba düzeyini doğrusal olmayan biçimde azalttığını ve τ parametresinin 0'dan 2'ye yükselmesi durumunda çabanın yaklaşık %83 oranında düştüğünü ortaya koymaktadır. Çalışma ayrıca, formel bir model çıkarımı olmaktan ziyade modelin yorumsal bir uzantısı olarak, Türkiye işgücü piyasasında istihdam sözleşmelerinin görece eksikliğine ilişkin kurumsal bulguların daha yüksek bir başlangıç görev belirsizliği düzeyine karşılık geldiğini ve modelin öngördüğü üretkenlik kayıplarının bu bağlamda güçlenmesinin beklendiğini savunmakta; firma içi sözleşme tasarımına yönelik üç düzeyli bir politika çerçevesi önermektedir.

Anahtar Kelimeler: çalışma ekonomisi, hibrit çalışma, üretkenlik

INTRODUCTION

The factors influencing firm-level productivity have been extensively examined in economic literature; wage structures, performance evaluation, job design, and intra-organizational incentive systems represent the core research inquiries of labor economics. Lazear's systematic approach (1995, 2000) and the work of Lazear and Gibbs (2014) have rendered the concealed mechanisms of task design, oversight, and effort selection inside the classical production function framework a focus of economic inquiry. This method demonstrates that a firm's productivity is influenced not just by the quantity of capital and labor but also by structural factors, including task definitions, the information available to employees, and the expenses associated with monitoring outputs.

This study agenda has acquired renewed importance due to the swift proliferation of hybrid work arrangements in conjunction with the COVID-19 pandemic. Organizations that adopted hybrid work have faced a scenario in which monitoring technology has fundamentally

evolved while employees are away from the office. In the post-pandemic era, numerous organizations have noted a substantial decrease in productivity metrics after adopting a hybrid model; nevertheless, they have not methodically analyzed the economic factors contributing to this fall. The existing economic literature predominantly focuses on the fall via the lens of technological infrastructure inadequacies and digital communication expenses while overlooking the evolution of intra-firm contract frameworks and task design.

The primary focus of the study is task ambiguity. Task ambiguity refers to a measure that signifies the degree to which an employee comprehends the parameters, priorities, scope of decision-making authority, and output expectations associated with the task they are performing. The concept has a well-established counterpart in the organizational behavior literature: role ambiguity, defined as the lack of clear information regarding the expectations, behaviors, and consequences associated with an organizational role (Kahn, Wolfe, Quinn, Snoek, and Rosenthal, 1964; Rizzo, House, and Lirtzman, 1970). The two literatures, however, treat the concept differently. Organizational behavior approaches role ambiguity primarily as a perceived psychological stressor, measured through self-report scales and linked to outcomes such as job dissatisfaction, tension, and reduced individual performance (Rizzo et al., 1970). The present study, by contrast, treats task ambiguity as an economic problem of information and contract design: an incompleteness in the specification of task priorities, decision rights, and output expectations within the employment contract, which distorts the agent's effort allocation and the principal's optimal incentive design. The two perspectives are complementary rather than competing, the organizational behavior tradition supplies validated measurement instruments for the construct, while the economic approach embeds it in an equilibrium framework of contracts and incentives; this complementarity is exploited in Section 5, where the measurement of the task ambiguity parameter τ is discussed. Within economics, this notion is situated at the convergence of task design (Lazear and Gibbs, 2014), the multitasking dilemma (Holmström and Milgrom, 1991), contract completeness (Hart and Moore, 1990), and information architecture (Holmström, 1979). In classical literature, it is posited that, with face-to-face monitoring, a firm could rectify an employee's effort and comprehension of tasks through daily observation at minimal expense; however, in a hybrid work arrangement, monitoring technology is fundamentally evolving, rendering this correction mechanism increasingly expensive.

Upon reviewing the existing economic research, three notable gaps emerge. The initial gap is that the labor economics research has predominantly focused on task design analysis based on office-based monitoring, failing to properly integrate the structural changes introduced by the hybrid work paradigm into the framework. The second gap is that recent empirical research on the economics of remote work (Bloom et al., 2015; Choudhury, Foroughi, and Larson, 2021) directly quantifies the productivity effect but inadequately investigates how this effect is influenced by the intra-firm contract regime and job design. The third gap is that the economic mechanisms through which task ambiguity affects productivity have been studied only in a piecemeal and implicit fashion; what is lacking is a framework that identifies these mechanisms as analytically distinct channels and connects them to the instruments of intra-firm contract design. Distinguishing the mechanisms is not merely of taxonomic interest: they operate through different margins and respond to different instruments, information search costs to task documentation and priority clarity, decision delays to the allocation of decision rights, renegotiation costs to contract adaptation procedures, and effective effort costs to incentive design. Contract or policy interventions that treat ambiguity as an undifferentiated

aggregate therefore risk targeting the wrong instrument; a mechanism-level diagnosis is a precondition for choosing among them.

This study seeks to propose a conceptual framework and a formal microeconomic model to rectify the identified deficiencies. The study aims to contribute to the economics literature in four primary ways: by offering a comprehensive conceptual framework that integrates four economic traditions-labor economics, principal-agent theory, incomplete contracts literature, and decision-making under uncertainty (the real options approach); by delineating the mechanisms through which task ambiguity influences productivity across four distinct economic channels; by elucidating the effects of structural changes in monitoring technology on optimal contract design at both conceptual and analytical levels; and by generating specific policy implications regarding intra-firm contract regimes, task design processes, and digital monitoring technology. These four traditions are not invoked as parallel references; each performs a distinct function within the analytical architecture of the study. The incomplete contracts literature explains why task ambiguity exists in the first place: since employment contracts cannot fully specify task priorities and decision rights *ex ante*, ambiguity emerges as the contractual residual, and its level rises when *ex-post* adaptation becomes costlier - as under hybrid work. Personnel economics defines the design problem: it identifies task design as the instrument through which the firm can act on this residual, which is formalized in the endogenous investment extension of the model. Principal-agent theory supplies the equilibrium apparatus: the LEN framework determines how a given level of ambiguity translates into effort choices, optimal incentive intensity, and firm profit. Finally, the decision-making-under-uncertainty approach provides the behavioral microfoundation of the cost channel: it explains why agents facing ambiguity rationally delay decisions and search for information, which is what the ambiguity-related terms in the effort cost function represent. A clarification on the scope of the modeling contribution is warranted. The four mechanisms are disaggregated at the conceptual level, whereas the formal model deliberately represents their combined effect in reduced form, through a single task ambiguity parameter (τ) entering the agent's effort cost function. This modeling choice trades mechanism-level detail for analytical tractability within the LEN framework; the mechanism-level distinctions are preserved in the mapping between each mechanism and the corresponding instrument of the three-tiered policy framework, and the formal decomposition of τ into mechanism-specific components is identified as a direction for future research. The subsequent sections of the study are organized as follows: the second section contains the literature review, the third section outlines the methodology, the fourth section details the conceptual framework, the fifth section presents the formal model and numerical simulation results, and the sixth section encompasses the discussion and conclusion.

LITERATURE REVIEW

This section methodically examines the intersections of the four economic traditions-labor economics, principal-agent theory, incomplete contracts literature, and the economics of remote work-that constitute the conceptual framework of the study and identifies the three literature gaps outlined in the introduction.

The task design approach in labor economics has been formalized by Lazear (1995, 2000) and Lazear and Gibbs (2014) as an optimization issue influenced by job design, performance measurement, wage structure, and incentive schemes inside the intra-firm production process. Lazear (2000) established that the shift from a fixed wage to piece-rate compensation in the

Safelite Glass case resulted in a 44% enhancement in employee productivity; half of this improvement was attributable to selection, while the other half stemmed from the incentive effect. Bandiera, Barankay, and Rasul (2007) empirically examined the influence of managerial incentives on employee productivity; Athey and Roberts (2001) articulated the necessity for the integrated design of decision rights allocation and incentive frameworks; and Garicano (2000) illustrated that information costs determine organizational structure. The prevalent disadvantage of this research is that task design analyses have been formulated based on the premise of in-person work and little monitoring; the structural alterations introduced by the hybrid work model have not been systematically incorporated into the framework. This condition validates the first literature gap identified by the study.

The principal-agent theory, formulated by Holmström (1979), is predicated on information structure and observability. Within the classical framework, the principal is unable to directly observe the agent's effort, and optimal contract design seeks to balance incentives and risk-sharing through observable outputs. The LEN framework, created by Holmström and Milgrom (1987), delineated the requirements for the optimality of linear contracts in continuous time, serving as the foundational analytical instrument in contemporary contract design literature. The multi-task model by Holmström and Milgrom (1991) expanded the classical framework to encompass employees with various responsibilities and illustrated that incentives for quantifiable activities should be constrained to prevent the neglect of non-quantifiable tasks. The previously mentioned paradigm was enhanced by Baker (1992, 2002) through the concept of incomplete performance indicators; Feltham and Xie (1994) systematically examined the scenario of many indicators, and Dewatripont, Jewitt, and Tirole (2000) formally explored cognitive interconnections among activities. Prendergast (1999, 2002) in extensive literature surveys has demonstrated that the traditional risk-incentive equilibrium is only weakly corroborated by practical evidence and that unobservable factors, such as task ambiguity, can skew theoretical predictions. Bénabou and Tirole (2003) delineated the circumstances in which external incentives may diminish intrinsic motivation; Aghion and Tirole (1997) established the formal-real authority difference, which explicitly conceptualizes the essential notion of task ambiguity in the research. The absence of systematic application of this extensive literature within hybrid work regimes represents the second facet of the analytical gap the study aims to address.

The literature on incomplete contracts has evolved as a logical extension of the firm theory articulated by Coase (1937). Williamson (1985) established that transaction costs are a pivotal determinant of firm boundaries and that contract execution necessitates adaptive processes over time; Grossman and Hart (1986) and Hart and Moore (1990) formally illustrated within the property rights framework that actual contracts are intrinsically incomplete, resulting in ex-post renegotiation costs. Employment contracts exhibit a characteristic of incompleteness; it is infeasible to delineate all task specifications at the commencement of employment, necessitating ex-post adaptation mechanisms as an integral element of the contract framework (Bolton and Dewatripont, 2005, 2013). In a physical workplace, these mechanisms often function through informal communication; the hybrid work model disrupts these informal channels, exacerbating the effects of contractual deficiencies on organizational efficiency. The absence of systematic modeling of this mechanism represents the third element of the gap the work seeks to address.

The empirical literature investigating the impact of remote work on organizational productivity has swiftly proliferated in the post-pandemic age. Bloom, Liang, Roberts, and Ying (2015) illustrated through their field experiment with the Chinese travel company Ctrip that remote work enhanced individual performance by 13%; they attributed one-third of this improvement to a quieter work environment and two-thirds to diminished break durations. Choudhury, Foroughi, and Larson (2021) demonstrated that the shift to complete geographic flexibility in the U.S. Patent and Trademark Office enhanced production by 4.4%. While the two studies exhibit qualitative consistency, they significantly diverge in effect size; these contradictory results imply that the productivity impact of hybrid work may fluctuate based on intra-firm conditions-such as task type, monitoring technology, and contract structure-yet the economic mechanisms driving this conditionality remain unexamined. Yang et al. (2022) revealed in their study of 61,000 Microsoft employees that the shift to remote work altered collaboration networks into a more static and siloed configuration; this observation aligns with the assertion that the multitasking dilemma (Holmström and Milgrom, 1991) intensifies in a hybrid work environment, yet it remains unmodeled within a theoretical framework. Karaçınar and Filizöz (2024) and Aslan, Yaman, Aksu, and Topgül (2021) examine the performance effects of hybrid work within the Turkish labor market, while Çıplak, Yıldız, and Doğan (2024) assess employee opinions; however, these studies fail to incorporate the contract regime variable and lack an analysis of the economic mechanisms involved.

The aforementioned evaluation systematically substantiates the three literature gaps identified by the study: the insufficiency of the theoretical convergence between labor economics and the economics of remote work, the limited application of the principal-agent theory's multitasking extension within the hybrid work context, and the absence of a framework that identifies the mechanisms through which task ambiguity affects productivity as analytically distinct channels, including the ex-post adaptation costs emphasized by the incomplete contracts literature, and connects them to the instruments of intra-firm contract design. The study's conceptual framework and formal model seek to concurrently solve the three highlighted deficiencies.

METHODOLOGY AND CONCEPTUAL FRAMEWORK

This study utilizes a conceptual-theoretical research methodology, supported by formal microeconomic modeling. The choice of this design follows from the nature of the research problem. The objective of the study is not to estimate the magnitude of the productivity effect of hybrid work, a task already pursued by the empirical literature (Bloom et al., 2015; Choudhury, Foroughi, and Larson, 2021), but to identify the mechanisms through which task ambiguity generates such effects and to derive their implications for contract design. Three alternative designs were considered and set aside. A purely econometric design is premature at this stage: task ambiguity has not yet been established as an economic construct with an agreed operationalization, firm-level data jointly covering ambiguity, contract structure, and productivity are not available, and estimating reduced-form correlations without a theoretically grounded construct would not identify mechanisms. A purely verbal-conceptual analysis, conversely, could enumerate mechanisms but could not discipline them: it cannot establish their internal consistency, sign their interactions, or generate comparative statics. Simulation-based designs such as agent-based modeling can accommodate richer heterogeneity but sacrifice the closed-form transparency required to trace results back to assumptions. The combination adopted here, conceptual integration to define the construct

and its mechanisms, followed by a formal model in the LEN tradition to derive closed-form equilibrium results and testable propositions, retains the strengths of these alternatives while avoiding their respective limitations. The analytical framework consists of three phases. We initiate a systematic discourse among four economic traditions-labor economics, principal-agent theory, incomplete contracts literature, and decision-making under uncertainty-within the context of hybrid work regimes. This method highlights the synergistic connections between various traditions instead of just placing them side by side, in accordance with the conceptual integration framework proposed by Gibbons (1998). In the second step, the conceptual framework developed through systematic discourse is implemented via four economic processes; this mechanism-centric approach aligns with the analytical strategy proposed by Hedström and Ylikoski (2010) in the social sciences. The third step presents the analytical rationale of the framework via a modified multi-task principal-agent model developed by Holmström and Milgrom (1991), which includes the task ambiguity parameter; the model's primary outcomes are demonstrated through numerical simulation, yielding quantitative insights. The transition from the conceptual framework to the formal model is governed by an explicit set of translation rules rather than left implicit. Each element of the conceptual framework corresponds to a specific object of the model: the information search and effective effort cost mechanisms are represented by the ambiguity-related terms in the agent's effort cost function $C(e_1, e_2, \tau)$; the decision delay mechanism underlies the interpretation of τ as raising the marginal cost of effort, consistent with its real-options microfoundation; the ex-post renegotiation mechanism motivates the endogenous task design extension, in which the firm reduces the initial ambiguity level τ_0 through investment; the structural change in monitoring technology under hybrid work is captured by the output noise parameter σ_1^2 ; and the intra-firm contract regime is represented by the linear contract (α, β) . Conceptual claims that cannot be expressed through these model objects are not attributed to the model; they are treated as interpretive extensions, and the propositions derived in the concluding section are classified accordingly.

The complementarity among the four traditions holds under identifiable assumptions, and their points of divergence are equally explicit. All four share the premises of optimizing agents and of information frictions as central determinants of organizational outcomes; it is on this common ground that their integration is possible. They diverge, however, in what they treat as contractible: principal-agent theory in the LEN tradition assumes that a verifiable performance measure exists and that the structure of the environment is common knowledge, whereas the incomplete contracts literature denies precisely the possibility of fully contingent specification; and the real options approach, unlike the static LEN framework, emphasizes irreversibility and the intertemporal value of waiting. The integration strategy of the study respects these divergences by assigning each tradition to the analytical layer where its assumptions are least restrictive: incomplete contract theory explains the existence and level of task ambiguity (why $\tau > 0$); the LEN model, whose assumptions are defensible once the performance measure x_1 is taken as given, determines the equilibrium consequences of that ambiguity; and the real options logic is confined to the behavioral interpretation of the cost channel. The divergent assumptions are therefore not suppressed but allocated to different layers of the analysis.

The study's methodological drawback is the lack of direct empirical testing of the conceptual framework; however, this constraint is alleviated by the evaluation of the nine testable

propositions presented in the sixth chapter and the methodological tools accessible for testing each proposition.

The influence of task ambiguity on organizational productivity within a hybrid work environment is a multifaceted problem that, we argue, is difficult to capture adequately within a single economic theory, as its constituent mechanisms fall within the domains of different theoretical traditions. The phenomenon under consideration is partially examined by labor economics, principal-agent theory, incomplete contract literature, and decision-making under uncertainty; however, these frameworks have not been systematically interconnected or integrated within the context of hybrid work. The conceptual framework of this study is to establish a comprehensive analytical foundation by examining the interrelatedness of these four traditions, rather than juxtaposing them.

The initial axis of the framework is the task design methodology proposed by Lazear (1995) and Lazear and Gibbs (2014) in the realm of labor economics. This method regards the intra-firm production process as an optimization challenge influenced by task design, performance assessment, wage framework, and incentive mechanisms; it highlights that productivity is influenced not solely by production technology but also by the configuration of the intra-firm contractual system. This axis frames task ambiguity as a design challenge and delineates the minimization of ambiguity as an economic objective that enhances business profitability. The second axis is the principal-agent theory formulated by Holmström (1979) and subsequently expanded to address the multi-task problem by Holmström and Milgrom (1991). Within the classical paradigm, a corporation is unable to directly monitor an employee's effort, resulting in a moral hazard issue due to information asymmetry; optimal contract design seeks to balance incentives and risk-sharing based on observable outcomes. The multi-task extension indicates that incentives for quantifiable tasks must be constrained to avoid the disregard of non-quantifiable activities; this axis supplies the equilibrium apparatus through which the consequences of task ambiguity are analyzed. A clarification is warranted on how task ambiguity relates to the informational structure of this theory. In the classical principal-agent framework, information asymmetry favors the agent: the agent's effort (hidden action) or private information (hidden knowledge) is unobservable to the principal (Holmström, 1979). Task ambiguity, by contrast, is an informational friction operating in the opposite direction: the principal's knowledge of task priorities, decision rights, and output expectations is imperfectly transmitted to the agent a friction closely related to the distinction between formal and real authority drawn by Aghion and Tirole (1997), in which the allocation of effective decision-making depends on who is informed. Task ambiguity is therefore not classified here as a subtype of classical information asymmetry; it is a complementary informational friction that interacts with moral hazard by degrading the agent's ability to map effort onto valued output, which the model represents as an increase in the effective cost of effort. The third axis pertains to the incomplete contract literature established by Grossman and Hart (1986) and Hart and Moore (1990). This approach asserts that transaction costs and the inability to foresee future contingencies culminate in incomplete real-world contracts, thereby incurring ex-post renegotiation costs; employment contracts similarly reflect this characteristic. Williamson (1985) showed within transaction cost theory that contract execution requires adaptation over time. Recent empirical evidence indicates that the cost of this adaptation rises substantially when face-to-face interaction is removed. Battiston, Blanes i Vidal, and Kirchmaier (2021) show through a natural experiment that face-to-face communication significantly improves coworkers' task performance, implying that its removal raises the cost of transmitting job-

relevant information. Gibbs, Mengel, and Siemroth (2023) find that during the shift to remote work among over 10,000 IT professionals, time devoted to coordination activities and meetings increased while uninterrupted work hours and one-to-one meetings with supervisors declined, and identify rising communication and coordination costs as a principal source of the observed productivity decline. Emanuel, Harrington, and Pallais (2023) document that the feedback engineers received from teammates fell sharply once offices closed, with the losses concentrated among junior employees, precisely the group most dependent on low-cost, informal correction of task understanding. Together with the evidence of Yang et al. (2022) on the shift toward more static and siloed collaboration networks, these findings support the premise that ex-post contractual adaptation, which operates largely through informal communication, becomes markedly costlier under hybrid arrangements. The fourth axis relates to decision-making within the uncertainty framework developed by Dixit and Pindyck (1994). Reversible expensive actions generate genuine option value under uncertainty, and the wait-and-see approach arises as a logical reaction; Bloom (2009) and Baker, Bloom, and Davis (2016) have empirically shown that uncertainty consistently inhibits corporate decision-making.

Three essential complementary relationships exist among these four axes. Principal-agent theory elucidates the impact of labor economics task design on productivity by highlighting the information constraints inherent in this design. It provides a theoretical framework for contract design, while the literature on incomplete contracts asserts that actual contracts are inherently incomplete and necessitate ex-post adaptation processes. The decision-making under uncertainty method functions as a meta-axis that elucidates how the mechanisms outlined in the other three axes are reinforced in an environment characterized by increased uncertainty. This structure of complementarity is the analytical basis of the framework, which is made up of four economic mechanisms. The first mechanism has to do with the cost of getting information. An employee facing significant task ambiguity dedicates time to gathering information to ascertain the priority of their work, resulting in an opportunity cost. Conventional labor economics assumes that this cost is negligible, as an office worker can quickly resume productivity after a brief consultation. In a hybrid regime, information retrieval transpires over asynchronous communication platforms, resulting in prolonged wait times; this temporal loss is distributed across the manager's timetable, engendering a dual inefficiency. The secondary mechanism is decision procrastination. An employee experiencing significant task ambiguity refrains from making independent decisions and raises the matter to the management due to an unclear understanding of their decision-making power boundaries. This conduct can be construed as a logical reaction within the context of real options theory; decisions that entail significant reversal costs generate a waiting premium amid uncertainty (Dixit and Pindyck, 1994). At the organizational level, decisions often become bottlenecks at the managerial level, leading to a diminished capacity for decision-making; this phenomenon is particularly pronounced in middle management roles that necessitate intensive decision-making in daily operations. The third mechanism pertains to the costs associated with ex-post renegotiation. The divergence between the employee's production and the principal's planned output requires redoing the work; this scenario is classified as the ex-post adaptation cost in the incomplete contract literature (Grossman and Hart, 1986; Hart and Moore, 1990). In a face-to-face setting, discrepancies can be rectified inexpensively during the initial phases of work, whereas in a hybrid model, discrepancies are often identified only after substantial completion; this scenario exacerbates the cost of

revisions and demoralizes employees, adversely impacting future effort decisions. The fourth mechanism pertains to the cost of effective effort. The combined impact of the aforementioned three factors elevates the employee's effective cost of effort. Within the conventional principal-agent model, the employee's decision regarding effort is established at the juncture where the marginal cost of effort aligns with the anticipated marginal benefit (Holmström, 1979); in contexts characterized by significant task ambiguity, the marginal cost curve ascends, resulting in the employee experiencing an increased psychological and cognitive burden to maintain equivalent effort levels. The rise in expenses diminishes employee happiness in the near term, induces burnout in the medium term, and ultimately escalates employee turnover, undermining the firm's internal human resources.

The implementation of the framework within the Turkish setting reveals a unique three-dimensional situation. Before these dimensions are presented, their epistemic status should be made explicit: the observations below are institutional and empirical in origin and are not derived from the formal model. They enter the analysis by informing the plausible range of the model's parameters for the Turkish context, in particular, a higher initial level of task ambiguity (τ_0) and higher ex-post renegotiation costs, so the resulting assessments are interpretive applications of the model in the sense defined in the methodology section, rather than formal model results. The initial dimension indicates that the predominance of remote work substantially trails workforce desires; current studies reveal that remote work averages only 0.9 days per week, whereas employee demand averages 2.6 days. The identified demand-application gap signifies that the shift to hybrid labour in Turkey has not attained economic equilibrium and creates an advantageous environment for the reconfiguration of the internal contract framework. The Turkish labour market literature has explored task design and performance-based compensation to a limited degree; current studies (Karaçınar and Filizöz, 2024; Aslan, Yaman, Aksu, and Topgül, 2021) examine the performance implications of hybrid work but fail to incorporate the contract regime variable in their models. The third dimension indicates that employment contracts in Turkey are comparatively incomplete, and ex-post adaptation processes occur largely through informal communication. This characterization, documented early on in the institutional assessment of TÜSİAD (2004), is corroborated by current legal scholarship rather than resting on that single source. Although the 2016 amendment to Article 14 of the Labour Act (Law No. 6715) and the Remote Work Regulation of 2021 introduced formal requirements that remote-work contracts specify the definition, duration, place, and communication arrangements of the work, labor law scholarship documents that the existing legislation remains inadequate for the problems raised by remote work (Dulay Yangın et al., 2021). In the same vein, studies on working time under remote arrangements show that the boundary between working and rest time has become blurred and that expectations of constant availability persist without a clear contractual or statutory basis, since Turkish law contains no explicit regulation of a right to disconnect (Aydın and Kutlu, 2020; Erkanlı Başbüyük, 2023). This institutional characteristic implies that if monitoring technology undergoes structural transformation in a hybrid regime, the costs of ex-post renegotiation will be elevated relative to developed economies.

The framework articulates policy implications at three levels, focusing on enterprises' optimal contract design choices. The first step is to design the tasks. Conventional job descriptions rely on a task list framework, rendering them insufficient in a hybrid environment; these documents must be transformed into a contractual instrument that encompasses task prioritisation (the significance of tasks in the firm's value function), a decision authority matrix

(the matters on which the employee can independently decide), and performance metrics (a precise definition of observable outputs). This transformation aligns with the job design methodology suggested by Lazear and Gibbs (2014) and, in accordance with the incomplete contract theory of Hart and Moore (1990), redefines the job description from a static document to a dynamic and renegotiable component of the employment contract; practically, this change directly diminishes the level of task ambiguity τ , as defined in the model. The secondary tier pertains to monitoring technology. The hybrid regime elevates the expenses associated with in-person oversight, necessitating the development of digital monitoring systems as a novel information framework. Within Holmström's (1979) theory, the characteristics of monitoring technology directly influence the optimal intensity of incentives; as the output measurement noise σ^2 diminishes, the marginal return of the incentive escalates. Given that the hybrid regime inherently elevates σ^2 , digital monitoring instruments should be developed in a compensating fashion. Nonetheless, the design of monitoring presents two limitations: excessive digital surveillance jeopardises employee autonomy and privacy, thus infringing upon the participation constraint; as monitoring escalates towards quantifiable outputs, the attention devoted to non-quantifiable tasks diminishes in accordance with the multitasking framework (Holmström and Milgrom, 1991). Consequently, the design should prioritise an accurate observational structure over simply increasing the number of observations. At the tertiary level, there is an incentive programme. The multitask framework (Holmström and Milgrom, 1991) demonstrates that associating incentives with a single measurable outcome is ineffective in contexts characterised by significant task ambiguity; it is recommended that incentive structures be founded on three principles. The first principle posits that the magnitude of incentives provided for quantifiable results should be inversely related to the significance of non-quantifiable outcomes. The second concept is reconciling team-based reward elements with individual incentives; team-based incentives partially address the challenge of assessing intangible activities (knowledge sharing, mentorship, and corporate culture transmission) (Holmström, 1982). The third principle states that incentive plans must be consistent from one period to the next and not change too often. The findings of performance-based pay methods in Turkey's public health sector (Sarisoy and Erdoğan, 2022) demonstrate the importance of these principles; incentive systems centred on a singular measurable outcome result in a decline in quality.

FORMAL MODEL: A MULTI-TASK PRINCIPAL-AGENT PROBLEM UNDER TASK AMBIGUITY

This part re-evaluates the issue of task ambiguity, previously addressed conceptually in the fourth chapter, through a formal microeconomic model. The model is a modified iteration of the multi-task principal-agent framework established by Holmström and Milgrom (1991), integrating the task ambiguity parameter. The main goal of the model is to show how the changing monitoring technology in the hybrid work regime affects the best way to write contracts and how the agent divides their work. It also provides a way to make sense of the conflicting results of studies by Bloom et al. (2015) and Choudhury, Foroughi, and Larson (2021) using the task ambiguity parameter.

Model Setup and Task Ambiguity Parameter

The employment connection between the principal (business) and the agent (employee) is viewed as a resource allocation process governed by a hierarchical contract rather than market prices, consistent with Coase (1937) and Williamson (1985). The agent allocates their efforts

between two distinct tasks: the first task is observable with measurable outputs (sales volume, units produced, and completed reports), whereas the second task is unobservable, yielding outputs that cannot be directly quantified but provide value to the organization (team information sharing, mentoring, and long-term strategic contributions). This dichotomy constitutes the essential framework of the multitasking problem as systematized by Holmström and Milgrom (1991) and has also been analyzed by Baker (1992) in the context of incomplete performance indicators.

The effort levels assigned by the representative to the first and second tasks are represented by $e_1 \geq 0$ and $e_2 \geq 0$, respectively. The observable output x_1 is defined as $e_1 + \varepsilon_1$, whereas the unobservable output x_2 is defined as $e_2 + \varepsilon_2$, where ε_1 follows a normal distribution $N(0, \sigma_1^2)$ and ε_2 follows a normal distribution $N(0, \sigma_2^2)$, with both ε_1 and ε_2 being separate Gaussian noise terms. This framework is a recognized premise inside the LEN (linear-exponential-normal) model proposed by Holmström and Milgrom (1987); despite Feltham and Xie (1994) relaxing the independence requirement between ε_1 and ε_2 , the qualitative conclusions remain consistent. The firm's total value function is linear: $V(e_1, e_2) = v_1 \cdot e_1 + v_2 \cdot e_2$, where v_1 and v_2 , both greater than zero, represent the marginal value contributions of the two tasks to the firm, respectively.

In contrast to the conventional Holmström-Milgrom framework, this model incorporates the task ambiguity parameter $\tau \geq 0$ into the agent's effort cost function. The parameter in question serves as an inverse measure of an employee's comprehension of their work boundaries, priorities, and decision-making authority; $\tau = 0$ signifies optimal role clarity, whereas $\tau \rightarrow \infty$ indicates maximal task ambiguity. Although τ is a theoretical construct, it is measurable in principle, and its magnitudes carry a concrete economic interpretation. Within the model, $(1+\tau)$ scales the marginal cost of effort; τ therefore measures the proportional increase in the marginal cost of productive effort relative to the benchmark of full role clarity. Accordingly, $\tau = 0.5$ corresponds to a situation in which delivering a given level of task-directed effort is 50% costlier at the margin than under full clarity, and $\tau = 1$ to a doubling of that marginal cost, for instance because part of the agent's gross effort is misdirected and must be repeated once priorities are clarified. Two complementary measurement strategies follow. On the survey side, the validated role ambiguity scales of the organizational behavior literature (Rizzo, House, and Lirtzman, 1970) provide standardized job and firm-level scores that can be mapped monotonically into τ , permitting comparisons of ambiguity levels across firms and jobs. On the revealed-preference side, the model itself implies an indirect measurement: since the optimal incentive intensity satisfies $\beta^* = v_1/[1 + r\sigma_1^2(1+\tau)]$, observed contract slopes, combined with estimates of risk aversion and output noise, can be inverted to recover the implied value of τ , in the spirit of calibration exercises in structural personnel economics. This inclusion is the study's original contribution, grounded in the bounded rationality framework established by Simon (1947) and the formal-real authority dichotomy articulated by Aghion and Tirole (1997). The agent's effort cost function is expressed as $C(e_1, e_2, \tau) = (1/2)(e_1^2 + e_2^2) + (\tau/2) \cdot (e_1^2 + e_2^2) + \gamma \cdot \tau \cdot e_1 \cdot e_2$ (where $\gamma > 0$). The initial element of this function is the traditional quadratic effort cost (Mirrlees, 1976; Holmström, 1979); the subsequent element denotes the task ambiguity tax and serves as the mathematical equivalent of the effective effort cost mechanism within the theoretical framework (Conlisk, 1996); the final element is the effort allocation cost, which indicates that distributing the agent's effort across two tasks incurs a cost (Dewatripont, Jewitt, and Tirole, 2000). The convexity of the cost function necessitates that the Hessian matrix be positive definite, which is guaranteed by the requirement $\gamma < (1+\tau)/\tau$.

The multiplicative form in which τ enters the cost function is a deliberate specification choice, justified by three considerations. First, nesting: at $\tau = 0$ the function reduces exactly to the standard quadratic specification of the Holmström–Milgrom framework, so every departure from the classical results is attributable to ambiguity alone. Second, microfoundation: the multiplicative form is equivalent to an effort-misdirection interpretation. If, under ambiguity, a share of the agent's gross effort a is misallocated so that effective task-directed effort equals $e = a/(1+\tau)^{1/2}$, then the cost of delivering effective effort e is $(1/2)(1+\tau)e^2$ precisely the specification adopted. Ambiguity thus taxes effort proportionally rather than by a fixed amount, which accords with the mechanisms it represents: the costs of information search and misdirected work scale with the volume of work undertaken. Third, minimality: alternative specifications fail at least one desirable property. An additive term independent of effort would leave marginal decisions, and hence incentives, unaffected; a term linear in effort would shift the participation constraint without generating the ambiguity, incentive interaction that is the object of study; and higher-order forms would sacrifice the closed-form tractability of the LEN framework. The multiplicative specification is therefore the minimal form that nests the baseline model, admits a transparent microfoundation, and preserves analytical tractability. The qualitative results reported below are robust to replacing $(1+\tau)$ with $(1+\tau)^k$ for $k > 0$, since monotonicity and convexity are preserved.

The principal can provide an incentive to the agent solely based on the observable output x_1 . The linear contract formulation is $w(x_1) = \alpha + \beta \cdot x_1$, where α represents the fixed fee, and $\beta \geq 0$ denotes the intensity of the performance-based incentive. Holmström and Milgrom (1987) established the optimality of the linear contract within a continuous time framework. The agent possesses a constant absolute risk aversion (CARA) parameter $r > 0$, characterized by the utility function $u(w) = -\exp(-r \cdot w)$ (Pratt, 1964; Arrow, 1965). Given these assumptions, the certainty equivalent utility of the agent is expressed as $CE = \alpha + \beta \cdot e_1 - C(e_1, e_2, \tau) - (r/2) \cdot \beta^2 \cdot \sigma_1^2$; the final term denotes the expense of the risk premium (Bolton and Dewatripont, 2005; Laffont and Martimort, 2002).

Solution: The Agent's Choice Of Effort And The Principal's Optimal Contract

The agent selects effort levels that will optimize its certainty equivalent utility. The first-order requirements are derived as $\partial CE / \partial e_1 = \beta - (1+\tau) \cdot e_1 - \gamma \cdot \tau \cdot e_2 = 0$ and $\partial CE / \partial e_2 = -(1+\tau) \cdot e_2 - \gamma \cdot \tau \cdot e_1 = 0$. The second condition illustrates the agent's assessment of the unobservable activity exclusively based on its cost, owing to the absence of incentives for this task in the contract, in accordance with the core principle of the multitasking problem articulated by Holmström and Milgrom (1991). From the second equation, $e_2^* = -[\gamma \cdot \tau / (1+\tau)] \cdot e_1$ is derived; this will be negative when $\gamma \cdot \tau > 0$, making it logical for the agent to select $e_2^* = 0$ as a corner solution. This corner solution is a prevalent analytical outcome in multitasking models and has been similarly derived by Baker (2002) within the framework of incomplete performance indicators. As task ambiguity escalates, the agent is likely to entirely discontinue effort allocation to the task; this outcome serves as a formal validation of the assertion that the multitasking dilemma within the conceptual framework intensifies under conditions of task ambiguity.

In the corner solution, the first-order condition for the initial job simplifies to $\beta - (1+\tau) \cdot e_1 = 0$, yielding the optimal effort level $e_1 = \beta / (1+\tau)$. This expression produces four comparative static outcomes: (i) $\partial e_1^* / \partial \beta = 1 / (1+\tau) > 0$, indicating that an increase in incentive intensity enhances effort, consistent with standard principal-agent theory (Holmström, 1979); (ii) $\partial e_1^* / \partial \tau = -\beta / (1+\tau)^2 < 0$, suggesting that as task ambiguity escalates, the observable effort dedicated to the

task diminishes, this finding is a novel contribution to the literature and aligns qualitatively with the results of Dewatripont et al. (2000) and Bénabou and Tirole (2003); (iii) $\partial^2 e_1^* / \partial \beta \partial \tau = -1/(1+\tau)^2 < 0$, demonstrating that the impact of incentive intensity on effort diminishes with increasing task ambiguity—this cross derivative implies that in firms transitioning to hybrid work with high task ambiguity, performance-based wage increases fail to yield the anticipated productivity effect; (iv) the e_1^* function is linear in β and concave in τ . In this approach, the agent's confidence equivalent utility is expressed as $CE^* = \alpha + \beta^2/[2(1+\tau)] - (r/2) \cdot \beta^2 \cdot \sigma_1^2$; task ambiguity τ directly diminishes the agent's semi-quadratic incentive gain by $\beta^2/[2(1+\tau)]$.

The principal selects the incentive intensity that will optimize predicted profit. The fixed salary α meets the participation requirement with equality, where the agent's reservation utility is denoted as $\bar{u}$, $\alpha = \bar{u} - \beta^2/[2(1+\tau)] + (r/2) \cdot \beta^2 \cdot \sigma_1^2$, and the best incentive intensity β is determined by the first-order condition as $\beta = v_1/[1 + r \cdot \sigma_1^2 \cdot (1+\tau)]$. This expression generalizes the classical Holmström–Milgrom result $\beta^* = v_1/(1 + r \cdot \sigma_1^2)$: at $\tau = 0$ the two coincide, and for $\tau > 0$ the term $r \cdot \sigma_1^2$ in the denominator is scaled up by the factor $(1+\tau)$. Three economic insights arise: (i) $\partial \beta^* / \partial \sigma_1^2 < 0$, indicating the traditional risk-incentive equilibrium (Aggarwal and Samwick, 1999; Prendergast, 2002); (ii) $\partial \beta^* / \partial \tau < 0$, suggesting that as task ambiguity escalates, the optimal intensity of incentives diminishes, this finding is a modification of Baker's (2002) thesis regarding incomplete performance metrics in relation to task ambiguity; (iii) the third insight concerns the channel through which τ operates, and it requires precision. Task ambiguity enters the model exclusively through the cost function: the measurement technology is unaffected, since $x_1 = e_1 + \varepsilon_1$ with $\varepsilon_1 \sim N(0, \sigma_1^2)$ regardless of τ . The appearance of $\sigma_1^2(1+\tau)$ in the denominator of β^* is therefore not evidence that ambiguity adds noise. Its algebraic origin is the standard result that optimal incentive intensity depends on the product of risk aversion, output noise, and the curvature of the effort cost function - $\beta^* = v_1/(1 + r \cdot \sigma_1^2 \cdot C'')$, where $C'' = (1+\tau)$ is the second derivative of the cost of task-1 effort. Ambiguity raises this curvature and thereby amplifies the incentive-dampening effect of any given amount of noise; it does not generate noise itself. In the optimal contract formula the two are observationally equivalent, an increase in τ is indistinguishable from a proportional increase in σ_1^2 , which is why task ambiguity can be described as a risk-equivalent factor. The channels are nonetheless distinct, as the risk-neutral benchmark makes transparent: at $r = 0$, output noise becomes irrelevant to the contract ($\beta^* = v_1$ for any σ_1^2), yet equilibrium effort $e_1^* = v_1/(1+\tau)$ continues to fall in τ . The cost channel operates even when the risk channel is shut down; the interaction with noise matters only when $r > 0$. By inserting β^* , the equilibrium effort level of the agent is determined as $e_1^*(\beta^*, \tau) = v_1/\{(1+\tau) \cdot [1 + r \cdot \sigma_1^2 \cdot (1+\tau)]\}$. The $(1+\tau)$ term appears twice in the denominator because ambiguity depresses effort through two distinct margins: directly, by raising the marginal cost of effort for a given incentive intensity, and indirectly, by lowering the optimal incentive intensity itself. The combined effect is therefore nonlinear in τ .

The model can integrate the impact of the hybrid work regime through two factors. The initial factor is σ_1^2 monitoring noise, which escalates in a hybrid environment owing to the deficiencies of digital monitoring instruments (Bloom et al., 2015). Secondly, the hybrid regime raises task ambiguity τ , and the channel through which it does so can be stated structurally rather than by analogy. Let $m \geq 0$ denote the intensity of informal, synchronous interaction between the agent and the principal or coworkers, and let the clarification input consist of deliberate task-design investment I plus the clarification byproduct of informal interaction, $\kappa \cdot m$ with $\kappa > 0$. Anticipating the endogenous task design extension presented below, the ambiguity level can be written as $\tau = \tau_0 \cdot \exp[-\varphi \cdot (I + \kappa \cdot m)]$. Under face-to-face arrangements m

is high: clarification arrives continuously, as a near-costless byproduct of colocation, keeping τ low even when deliberate investment is zero. The transition to hybrid work is, in this formulation, a fall in m the ambient flow of clarification weakens. The evidence of Yang et al. (2022) enters the model precisely at this point: not as a direct measurement of τ , but as evidence on m . The documented shift of collaboration networks toward more static, siloed, and asynchronous communication indicates a substantial decline in the informal interaction intensity that m represents. Since $\partial\tau/\partial m = -\varphi\kappa\tau < 0$, a lower m raises τ unless the firm compensates through deliberate investment I ; this is the formal content of the claim that hybrid work converts task clarity from a free byproduct of colocation into a costly object of organizational design. The concurrent rise of these two parameters yields three results: the effort dedicated to observable tasks e_1^* diminishes due to the combined effects of the reduction in β^* and the escalation in $(1+\tau)$; the effort assigned to unobservable tasks e_2^* declines to zero, elucidating the documented decline of soft skills in hybrid settings; and organizations shifting to hybrid work cannot merely offset this deficit by amplifying incentive intensity, as indicated by the result $\partial^2 e_1^*/\partial\beta\partial\tau < 0$. The ideal policy response entails implementing task design adjustments that directly decrease τ and enhancing monitoring technologies that lower σ_1^2 . The incomplete nature of employment contracts in the Turkish labor market (TÜSİAD, 2004) indicates that the initial value of τ is elevated relative to developed economies, leading to the expectation that the shift to hybrid work will result in greater productivity losses in Turkish firms than the model anticipates.

Investment in Endogenous Task Design

In the baseline model, the task ambiguity parameter τ is treated as exogenous; this section endogenizes it. Since it might otherwise appear that τ silently changes its nature between sections, from an environmental condition into a firm-controlled variable, the theoretical status of this transition should be made explicit. Throughout the study, τ is a property of the employment relationship, not an attribute of the worker: as defined in the Introduction, it measures the incompleteness with which task priorities, decision rights, and output expectations are specified and communicated to the agent. This is precisely the contractual residual identified by the incomplete contracts tradition, and personnel economics identifies task design as the instrument through which the firm acts on that residual. What separates the baseline from the extension is therefore not the ontology of τ but the analytical time horizon. At the contracting stage, the specification environment is inherited and τ is exogenous: no feasible adjustment of the wage contract (α, β) alters it. At the organizational design stage, the firm chooses its investment in task documentation, priority-setting, and communication protocols, and τ becomes an object of choice. The extension developed in this section models that design stage. The company invests in improvements $I \geq 0$, beginning from the initial level τ_0 , with the final task ambiguity $\tau(I)$ defined as $\tau(I) = \tau_0 \cdot \exp(-\varphi \cdot I)$, where $\varphi > 0$ is the investment efficiency parameter indicative of the firm's organizational capacity. The exponential decay model posits that the investment in task design adheres to the principle of diminishing returns and aligns with the organizational design investment framework established by Athey and Roberts (2001). As anticipated in the analysis of the hybrid regime above, this formulation generalizes to $\tau = \tau_0 \cdot \exp[-\varphi \cdot (I + \kappa \cdot m)]$, where m denotes the intensity of informal synchronous interaction: under colocation, high m keeps ambiguity low even at $I = 0$, whereas the hybrid-induced fall in m shifts the burden of clarification onto deliberate investment I . A further implication of the decreasing-returns structure deserves note: because clarification is costly ($\kappa > 0$) and returns diminish, the firm's optimal choice leaves residual ambiguity $\tau(I^*) > 0$ in

equilibrium. Endogenizing τ therefore does not imply that the firm can or will eliminate ambiguity; it implies that the equilibrium level of ambiguity is itself an economic outcome which is the incomplete-contracts insight restated at the level of job design. When the unit cost of investment is denoted as $k > 0$, the firm's augmented profit function simplifies to $\pi(I) = v_1^2 / \{2 \cdot (1 + \tau(I)) \cdot [1 + r \cdot \sigma_1^2 \cdot (1 + \tau(I))]\} - k \cdot I$.

The optimal investment level I^* is ascertained by an implicit equation, and the comparative static findings yield four essential insights via the implicit function theorem. Initially, $\partial I^* / \partial v_1 > 0$; when the marginal value contribution of the first task to the company rises, the optimal investment in task design likewise escalates. Second, $\partial I^* / \partial r > 0$; as the agent's risk aversion increases, optimal investment also increases. This finding shows that there is a substitution relationship between task design investment and incentive intensity. This means that the company chooses to improve effort through task clarity instead of giving a risk-averse employee big incentives, which would be costly. Thirdly, $\partial I^* / \partial \sigma_1^2 > 0$; when monitoring noise escalates, optimal investment grows, indicating that companies ought to augment their task design investments due to the structural elevation of σ_1^2 in the hybrid regime. Fourth, $\partial I^* / \partial k < 0$ and $\partial I^* / \partial \varphi > 0$ are conventional insights in investment theory (Dixit and Pindyck, 1994). The investment efficiency parameter for task design φ of Turkish firms is anticipated to be comparatively lower than that of developed economies, attributable to factors such as corporate human resources competence, management training levels, and digital infrastructure conditions. This scenario culminates in a diminished optimal investment level, thereby producing a heightened level of task ambiguity at equilibrium.

Numerical Simulation and the Limitations of the Model

A numerical simulation was performed to elucidate the practical implications of the analytical conclusions, using the baseline calibration $v_1 = 1$, $v_2 = 0.5$, $r = 1$, $\sigma_1^2 = 1$, $\bar{u} = 0$, and $\gamma = 0.5$. These values are normalizations and benchmark choices rather than empirical estimates, and their economic content is as follows. Setting $v_1 = 1$ normalizes the scale: all monetary magnitudes are expressed in units of the marginal value of the observable task, and since β^* , e_1^* , and π^* scale monotonically in v_1 , the percentage responses to τ , the objects of interest, are independent of this choice. The ratio $v_1/v_2 = 2$ states that the observable task is twice as valuable at the margin as the unobservable one, a deliberately conservative choice ensuring that the results are not driven by overweighting the unmeasured activity; given the corner solution $e_2^* = 0$, v_2 does not affect the reported equilibrium values. The composite $r\sigma_1^2 = 1$ defines a neutral risk benchmark at which the risk cost and the incentive benefit are of the same order, placing $\beta^* = 0.5$, the midpoint of its feasible range, at $\tau = 0$; what matters for the results is only this product, which is varied in the sensitivity analysis below. The reservation utility $\bar{u} = 0$ is a location normalization affecting only the fixed salary α . Finally, $\gamma = 0.5$ satisfies the convexity requirement $\gamma < (1 + \tau)/\tau$ for every τ considered (indeed for all τ , since $(1 + \tau)/\tau > 1$); because the equilibrium involves $e_2^* = 0$, γ has no effect on the reported magnitudes, and its role is confined to guaranteeing the mathematical consistency of the cost function. The range $\tau \in [0, 5]$ spans full role clarity to severe ambiguity, with $\tau = 1$, a doubling of the marginal cost of effort relative to full clarity, in the sense defined above, serving as the focal moderate case. Table 1 displays the equilibrium magnitudes corresponding to varying values of the task ambiguity parameter τ ; an increase in τ from zero to five results in a reduction of optimal incentive intensity by nearly 71%, alongside a decline in equilibrium effort and firm profit exceeding 95%. Relative to the $\tau = 0$ baseline, at the $\tau = 1$ level, the optimal incentive intensity diminishes by 33.3%,

while equilibrium effort and firm profit decline by 66.7%; at the $\tau = 2$ level, these metrics reduce by 50% and 83.3%, respectively. The non-linear rise of percentage changes quantitatively validates the analytical finding that marginal increases in task ambiguity can substantially affect productivity, even with minimal increments.

The robustness of these results to joint variation of the remaining parameters can be characterized sharply. Since $\beta^* = v_1/[1 + r\sigma_1^2(1+\tau)]$ and $e_1^* = \beta^*/(1+\tau)$, the percentage responses of all equilibrium quantities to τ depend on the other parameters only through the composite risk burden $r\sigma_1^2$; they are invariant to v_1 (a pure scale factor) and, given the corner solution, to v_2 and γ . Panel B of Table 1 therefore reports the percentage declines for $r\sigma_1^2 \in \{0.5, 1, 2\}$, corresponding to halving and doubling the baseline risk burden. Two patterns emerge. First, the losses are quantitatively substantial across the entire range: even at the low risk burden $r\sigma_1^2 = 0.5$, moderate ambiguity ($\tau = 1$) erodes 62.5% of equilibrium effort and profit. Second, the risk burden amplifies the incentive response, the decline in β^* at $\tau = 1$ rises from 25.0% to 40.0% as $r\sigma_1^2$ increases from 0.5 to 2, confirming the interaction between the cost channel and the risk channel discussed above: ambiguity is costlier to incentive provision precisely where risk is already expensive.

τ	β^*	e_1^*	π^*	Percentage Change (e_1^*)
0,00	0,5000	0,5000	0,2500	—
0,25	0,4444	0,3556	0,1778	-28,9%
0,50	0,4000	0,2667	0,1333	-46,7%
1,00	0,3333	0,1667	0,0833	-66,7%
2,00	0,2500	0,0833	0,0417	-83,3%
5,00	0,1429	0,0238	0,0119	-95,2%

Note: Baseline calibration: $v_1 = 1$, $v_2 = 0.5$, $r = 1$, $\sigma_1^2 = 1$, $\bar{u} = 0$, $\gamma = 0.5$. The value $\gamma = 0.5$ satisfies the convexity condition $\gamma < (1+\tau)/\tau$ for every τ reported. Since the equilibrium features a corner solution in the second task ($e_2^* = 0$), the parameters γ and v_2 do not affect the equilibrium values reported; π^* is proportional to e_1^* under this calibration ($\pi^* = v_1 e_1^*/2$), so their percentage declines coincide. The percentage change column is calculated relative to the base $\tau = 0$.

Table 1. Equilibrium Sizes Under the Task Ambiguity Parameter τ

$r\sigma_1^2$	Decline in β^* ($\tau=1$)	Decline in β^* ($\tau=2$)	Decline in $e_1^* = \pi^*$ ($\tau=1$)	Decline in $e_1^* = \pi^*$ ($\tau=2$)
0,5	25,0%	40,0%	62,5%	80,0%
1,0 (baseline)	33,3%	50,0%	66,7%	83,3%
2,0	40,0%	57,1%	70,0%	85,7%

Note (Panel B): Percentage declines relative to $\tau = 0$ within each $r\sigma_1^2$ row. All equilibrium responses to τ depend on r and σ_1^2 only through the product $r\sigma_1^2$; they are invariant to v_1 , v_2 , and γ .

Table 1 - (Panel B). Sensitivity of equilibrium responses to the composite risk burden

Table 2 illustrates the transition scenario to hybrid work. In the face-to-face regime, $\sigma_1^2 = 0.5$ and $\tau = 0.1$ were employed; however, in the transition to the hybrid regime, $\sigma_1^2 = 1.5$ and $\tau = 1.0$ were utilized. When both parameters increase simultaneously, equilibrium effort

diminishes by 78.7% relative to the face-to-face baseline. The interpretation of this figure requires care. The individual percentage losses (41.5% for σ_1^2 alone and 57.4% for τ alone) sum to 98.9%, which exceeds the combined loss; in this arithmetic sense the interaction is sub-additive, as percentage losses necessarily are, each margin shrinks the base on which the other operates, and total losses are bounded by 100%. The economically meaningful benchmark is therefore not the sum of losses but the product of retention factors. If the two channels operated independently, the combined retention of effort would equal the product of the individual retentions, $0.585 \times 0.426 = 0.249$, implying a combined loss of 75.1%. The realized retention is 0.213, a loss of 78.7%, so the joint effect is stronger than even this multiplicative benchmark predicts. The source of the excess is visible in the optimal contract formula: σ_1^2 and τ enter β^* through the product $r\sigma_1^2(1+\tau)$, so an increase in either parameter raises the marginal impact of the other, while $(1+\tau)$ additionally depresses effort directly through the cost channel. The effects of the two parameters are thus sub-additive in percentage losses but super-multiplicative relative to the independence benchmark: the hybrid transition is more damaging than the sum of its parts would suggest once the correct metric is used.

Scenario	σ_1^2	τ	β^*	e_1^*
Face-to-face (base)	0,50	0,10	0,6452	0,5865
Only σ_1^2 Increase	1,50	0,10	0,3774	0,3431
Only τ Increase	0,50	1,00	0,5000	0,2500
Combined (hybrid)	1,50	1,00	0,2500	0,1250

Note: Base calibration: $v_1 = 1$, $r = 1$. In the hybrid scenario, σ_1^2 and τ have been increased together.

Table 2. Comparison of Scenarios for the Transition to Hybrid Work

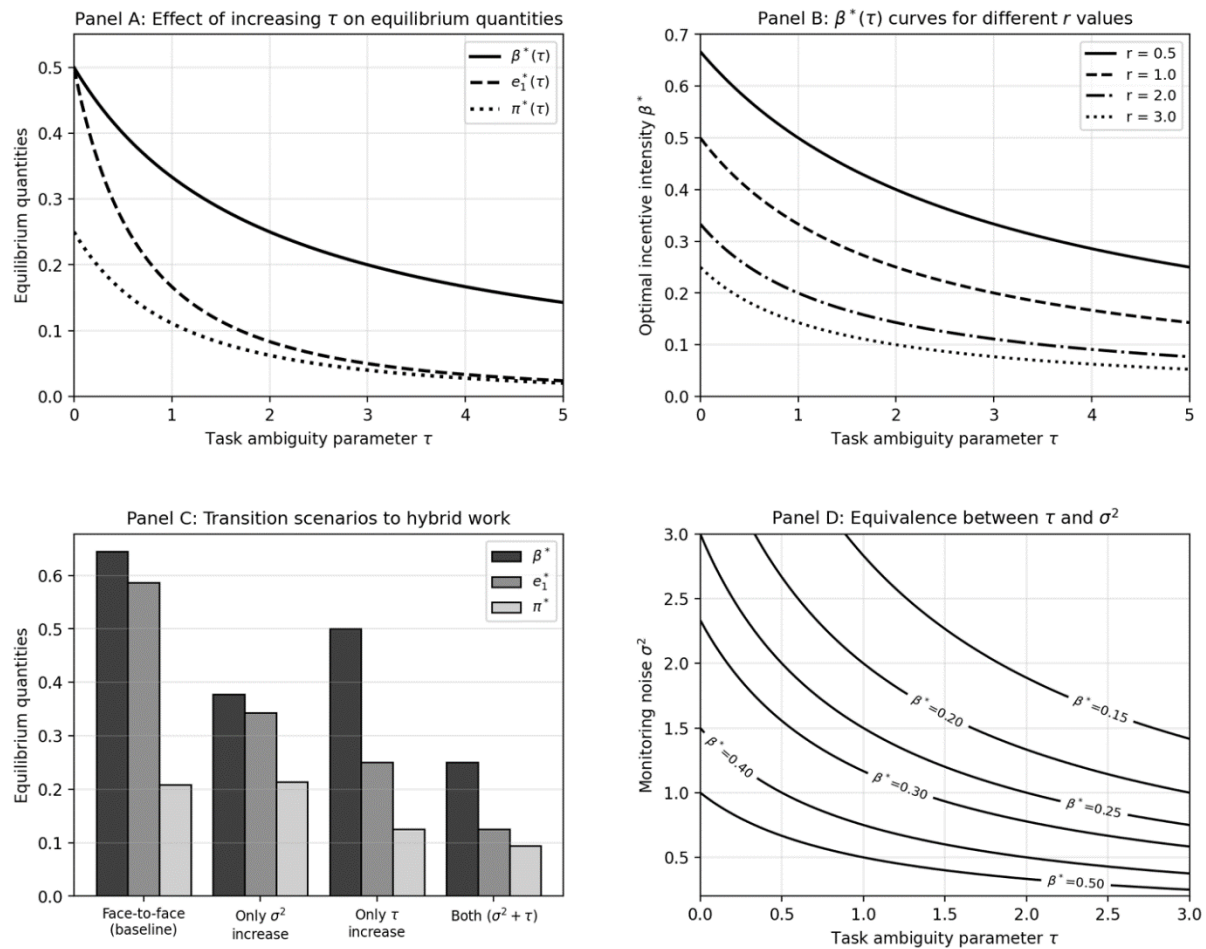
Table 3 illustrates the influence of the risk-aversion parameter r on the consequences of task ambiguity. At $r = 0.5$, increasing τ from zero to one diminishes the optimal incentive intensity by 25 percent; this reduction escalates to 33.3 percent, 40 percent, and 42.9 percent at $r = 1$, $r = 2$, and $r = 3$, respectively. The apparent impact of task ambiguity on diminishing incentive intensity for risk-averse employees reinforces the policy implication that such effects will be more significant in labor markets characterized by higher risk aversion, as observed in Turkey.

r	$\beta^* (\tau=0)$	$\beta^* (\tau=1)$	$\Delta (\%)$	$e_1^* (\tau=0)$	$e_1^* (\tau=1)$
0,5	0,6667	0,5000	-25,0%	0,6667	0,2500
1,0	0,5000	0,3333	-33,3%	0,5000	0,1667
2,0	0,3333	0,2000	-40,0%	0,3333	0,1000
3,0	0,2500	0,1429	-42,9%	0,2500	0,0714

Note: Base calibration: $v_1 = 1$, $\sigma_1^2 = 1$. The $\Delta (\%)$ column shows the percentage change in the optimal incentive intensity when transitioning from $\tau = 0$ to $\tau = 1$.

Table 3. Moderation of the Effect of τ on the Change in Risk-Aversion r

To present a visual summary of the model's key results, a four-panel comparative static analysis graph is shown in Figure 1.



Note: Panel A: The effect of τ on the equilibrium values of β^* , e_1^* , and π^* . Panel B: $\beta^*(\tau)$ curves for different levels of risk aversion. Panel C: Comparison of scenarios for transitioning to a hybrid model. Panel D: Equivalence between τ and σ^2 (iso-curves of β^*).

Figure 1. Task Ambiguity Model - Comparative Static Analysis

When analyzed collectively, the four panels of Figure 1 reveal that Panel A illustrates the nonlinear diminishing impact of task ambiguity on equilibrium magnitudes, Panel B indicates that this effect is moderated and intensified in risk-averse employees, Panel C demonstrates the interactive loss structure influenced by two parameters during the transition to hybrid work, and Panel D portrays the functionally analogous roles of task ambiguity and monitoring noise in the principal's optimal incentive decision-making.

The model possesses numerous significant drawbacks. The establishment inside the LEN framework and reliance on the CARA utility function assumption constitutes a constraint; research indicates that under broader utility functions (e.g., CRRA), the optimal contract may vary in a non-linear fashion (Mirrlees, 1999; Holmström, 1979). Secondly, the model is single-period; in a multi-period context, reputation effects (Holmström, 1999), learning dynamics (Prendergast, 1999), and the evolution of task ambiguity over time can enhance the findings. Thirdly, the scenario of bilateral information asymmetry, wherein the agent possesses less information regarding τ than the principal, has not been modeled and should be incorporated into the framework of the revelation principle established by Myerson (1979). Fourthly, the

model is constrained to two tasks; in reality, employees engage in multiple activities, and the team production environment (Itoh, 1991) presents an opportunity for expansion in this regard. Proposed avenues for expansion to mitigate these limitations include the examination of learning dynamics within a multi-period framework as articulated by Gibbons and Murphy (1992), structural parameter estimation utilizing firm-level panel data akin to the approach of Bandiera, Barankay, and Rasul (2007), the formulation of team-oriented incentive structures amidst task ambiguity (Itoh, 1991; Holmström, 1982), and explorations into the impact of AI-driven work tools on monitoring technologies and task design.

DISCUSSION AND CONCLUSION

This study has established a conceptual economic framework elucidating the influence of task ambiguity on business production within a hybrid work environment, substantiated by a formal microeconomic model. The paradigm is founded on four economic traditions: labor economics, principal-agent theory, incomplete contracts literature, and decision-making under uncertainty. The systematic discourse across these four traditions demonstrates that the hybrid work model fundamentally alters monitoring technology, requiring a reevaluation of intra-firm contract design. Productivity loss transpires through four economic mechanisms: information search costs, decision postponement, ex-post renegotiation costs, and effective effort costs. The economic rationale for the undetected productivity losses seen by organizations shifting to hybrid employment can be elucidated through a distinct analysis of these factors collectively.

The established formal model validates the primary assertions of the conceptual framework inside the mathematical domain. The incorporation of the task ambiguity parameter τ into the multi-task principal-agent model established by Holmström and Milgrom (1991) demonstrates that the effort the agent dedicates to the unobservable task diminishes to zero in the corner solution, while the effort devoted to the observable task also declines with increased task ambiguity; the model's most notable finding concerns the mechanism by which task ambiguity is converted into an incentive problem. Ambiguity enters the model through the cost side alone, it raises the curvature of the agent's effort cost function to $(1+\tau)$, and this specification is itself microfounded: it is algebraically equivalent to a setting in which a share of the agent's gross effort is misdirected under ambiguity and must be repeated once priorities are clarified, so that ambiguity taxes effort in proportion to the volume of work undertaken. Because the optimal incentive intensity depends on the product of risk aversion, output noise, and this cost curvature, $\beta^* = v_1 / (1 + r\sigma_1^2 \cdot C'')$ with $C'' = (1+\tau)$, the increase in curvature amplifies the incentive-dampening effect of any given amount of measurement noise. It is in this precise sense, and only in this sense, that task ambiguity operates as a risk-equivalent factor: in the optimal contract formula, an increase in τ is observationally equivalent to a proportional increase in the effective noise burden to $\sigma_1^2(1+\tau)$, even though the measurement technology itself is unaffected and the cost channel remains active even under risk neutrality. This mechanism implies that the principal optimally reduces incentive intensity as task ambiguity rises, and it demonstrates analytically that enterprises shifting to hybrid work cannot simply offset productivity declines through heightened incentives. The model's extension for investing in task design indicates that the optimal investment level in role clarity for the firm is influenced by the firm's marginal value contribution, employee risk aversion, and monitoring noise; numerical simulations demonstrate that the effect of marginal increases in task ambiguity on productivity escalates non-linearly.

The framework and model produce nine testable propositions for forthcoming empirical investigation. Following the translation rules stated in the methodology section, the propositions are explicitly classified by their epistemic source. Model-based propositions (M) follow from the equilibrium conditions or comparative statics of the formal model; interpretation-based propositions (I) are consistent with the model but rely on the conceptual framework, on empirical regularities external to the model, or on theoretical arguments not formalized here. The classification is stated for each proposition below. The initial two propositions pertain to the moderation structure: the impact of hybrid work on productivity is influenced not directly but by the degree of task ambiguity within the organization, yielding positive effects in low ambiguity and negative effects in high ambiguity—a proposition that harmonizes the results of Bloom et al. (2015) with those of Choudhury, Foroughi, and Larson (2021) a proposition classified as interpretation-based (I); the negative gradient of productivity in τ is a model result, but the prediction of positive effects at low ambiguity draws on empirical findings external to the model, which by construction generates no productivity gains from hybrid work. It is posited that empirical studies omitting the task ambiguity variable from the model will produce biased estimation coefficients, particularly in samples exhibiting significant heterogeneity in intra-firm contract regimes (a model-based proposition, M, following directly from the structural dependence of equilibrium outcomes on τ). The third and fourth propositions pertain to design-level policies: the impact of job description quality on mitigating task ambiguity experiences diminishing returns, and resources should be allocated to process-level monitoring mechanisms beyond a specific threshold (M, though it should be noted that the diminishing-returns property follows from the assumed exponential form of τ (I), so the proposition jointly tests the mechanism and the functional form); consistent with Aghion and Tirole (1997), the correlation between task clarity and employee autonomy is positive, challenging the traditional control-freedom dichotomy, as well-defined task parameters improve delegation capabilities. This fourth proposition is interpretation-based (I): the model contains no delegation margin, and the prediction rests on the theoretical argument of Aghion and Tirole (1997) rather than on a derivation within the present framework.

The fifth and sixth propositions pertain to the mediation structures of the mechanisms: the parallel mediator role is attributed to the information search cost, decision deferral, and ex-post renegotiation cost mechanisms, whereas the serial mediator role is ascribed to the effective effort cost mechanism; furthermore, it is posited that short-term productivity losses predominantly originate from the first two mechanisms, while medium and long-term losses emerge from the decision deferral and effective effort cost mechanisms. Both propositions are interpretation-based (I): the formal model represents the combined effect of the four mechanisms in reduced form and within a static setting, so mediation structures and time profiles are claims of the conceptual framework rather than derivations of the model. The seventh proposition pertains to the intra-firm hierarchy and asserts that the most significant impact of the decision deferral mechanism will occur in middle management roles, characterized by a high frequency of daily decisions—this assertion serves as a practical extension of the real authority distribution analysis within the context of Aghion and Tirole (1997). This proposition is likewise interpretation-based (I), since the model contains no hierarchical layer. The eighth and ninth propositions pertain specifically to Turkey: it is posited that the efficacy of the decision deferral mechanism, which functions through task ambiguity, is more pronounced in labor markets characterized by significant institutional legal uncertainty and relatively inadequate employment contracts—such as those in transition

economies like Turkey; furthermore, with the increasing prevalence of hybrid work in Turkey, it is expected that the four economic mechanisms will become more salient over time, exhibiting greater effect sizes than the current findings indicate. Both Turkey-specific propositions are interpretation-based (I) in the sense defined in the methodology section: they translate institutional evidence into expectations about the model's parameters, a higher initial ambiguity level τ_0 and costlier ex-post renegotiation, rather than following from the equilibrium analysis itself. The resulting distribution of labels, model-based status for the omitted-variable and diminishing-returns propositions, interpretation-based status for the mechanism-level, hierarchical, dynamic, and country-specific ones, is itself informative: it reflects the deliberate reduced-form representation of the four mechanisms in the formal model, and the conversion of the interpretation-based propositions into model-based ones through the formal decomposition of τ is a central item of the research agenda outlined below. The empirical testing strategy for these propositions necessitates diverse methodological instruments: the initial two propositions employ moderator effect analysis on firm-level panel data, the third and fourth propositions utilize within-firm field experiments (Bandiera, Barankay, and Rasul, 2011), the fifth and sixth propositions apply structural equation modeling, the seventh proposition engages in comparative studies across hierarchical levels within firms, and the eighth and ninth propositions leverage international comparative or time-series datasets.

The economic policy significance of the framework arises from its delineation of specific intervention areas for firms across three tiers: at the task design tier, the conversion of job description documents into contractual instruments; at the monitoring technology tier, the optimal configuration of digital observation mechanisms; and at the incentive scheme tier, the formulation of incentive structures appropriate for the multi-task framework. Three principal conclusions arise from a practical perspective. Initially, characterizing the productivity losses incurred during the shift to hybrid work as solely a technological infrastructure problem is economically insufficient; a considerable share of these losses arises from the inability to restructure the internal contractual framework within the organization. Secondly, the remedy must extend beyond mere documentation; along with the third argument, enhancing job description documents is vital yet insufficient, and digital monitoring tools along with incentive schemes must be restructured to align with the multitasking framework. Thirdly, companies shifting to hybrid work must focus on middle management roles; as stated in the seventh argument, the most significant economic disruption from decision deferral mechanisms occurs within these positions. The relevance of the framework within the Turkish context is notably significant; the relatively incomplete employment contracts in the Turkish labor market, the widespread informal meaning-making mechanisms, and the disparity in the transition to hybrid work between large enterprises and small to medium enterprises suggest that the mechanisms proposed by the framework will function more effectively in Turkish firms than in developed economies and that task design reforms possess considerable potential for improving firm productivity, an interpretive expectation grounded in the institutional evidence discussed earlier, rather than a formal result of the model.

The research possesses three primary limitations. The primary limitation is that the framework has not undergone direct empirical testing; the nine propositions outlined above constitute a rigorous testing strategy to address this problem. The second constraint is that the formal model is constructed inside the LEN framework and analyzed in a single-period static context; the model's limitations are elaborated upon in the final subsection of the fifth chapter. The

third constraint is that the framework is predominantly tailored to knowledge-intensive corporate sectors; it is important to acknowledge that mechanisms may function differently in manufacturing and service-oriented sectors. The forthcoming research agenda can be encapsulated in four dimensions: the methodical empirical evaluation of the nine propositions within the framework concerning Turkish firms, particularly through comparisons between large and small to medium enterprises; the enhancement of the formal model to incorporate additional endogenization, as well as multi-period and team production; the sectoral adaptation analyses of the framework; and theoretical investigations into how the framework will be revised in light of the extensive integration of AI-supported business tools-while large language models and assistant technologies may function as compensatory mechanisms for task ambiguity, they could also engender new sources of information asymmetry. This study's framework is intended to initiate the specified four-dimensional research agenda and offers a theoretical foundation for the systematic economic examination of hybrid work regimes within labor economics.

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GENİŞLETİLMİŞ ÖZET

Hibrit çalışma modellerinin pandemi sonrası dönemde hızla yaygınlaşması, firma içi sözleşmelerin ve iş tasarımının ekonomik temellerinin yeniden değerlendirilmesini zorunlu kılmıştır. Hibrit modele geçen pek çok organizasyon belirgin üretkenlik kayıpları bildirmiş; ancak bu kayıpların ekonomik kökenleri sistematik biçimde çözümlenmemiştir. Mevcut literatür, üretkenlik düşüşünü ağırlıklı olarak teknolojik altyapı yetersizlikleri ve dijital iletişim maliyetleri üzerinden ele almakta, firma içi sözleşme yapılarındaki ve iş tasarımındaki dönüşümü göz ardı etmektedir. Bu çalışma, söz konusu boşluğu doldurmayı amaçlamakta ve görev belirsizliği (task ambiguity) kavramını analizin merkezine yerleştirmektedir. Görev belirsizliği, çalışanın görevinin sınırlarını, önceliklerini, karar yetkisinin kapsamını ve beklenen çıktıyı ne ölçüde net biçimde kavradığını gösteren bir parametredir. Bu kavram, çalışma ekonomisinde görev tasarımı, asil-vekil teorisinde çoklu görev problemi, eksik sözleşme yazınında sözleşme eksikliği ve bilgi yapısı literatürlerinin kesişiminde konumlanmaktadır.

Çalışma, üç temel literatür boşluğunu tespit etmektedir: çalışma ekonomisi yazınının görev tasarımını yüz yüze gözetim varsayımı altında ele alması ve hibrit rejimin getirdiği yapısal dönüşümü içermemesi; uzaktan çalışma üzerine yapılan ampirik araştırmaların üretkenlik etkisini doğrudan ölçmekle birlikte firma içi sözleşme rejiminin bu etkiyi nasıl şekillendirdiğini yeterince incelememesi; ve görev belirsizliğinin üretkenliği etkilediği mekanizmaları analitik olarak ayrı kanallar biçiminde tanımlayıp firma içi sözleşme tasarımı araçlarıyla ilişkilendiren bir çerçevenin bulunmamasıdır. Bu boşluklar karşısında çalışma, dört iktisadi bakış açısını -çalışma ekonomisi, asil-vekil teorisi, eksik sözleşme yazını ve

belirsizlik altında karar verme yaklaşımı- bütünleştiren bir kavramsal çerçeve ile bu çerçeveyi destekleyen formel bir mikroekonomik model ortaya koymayı amaçlamaktadır.

Çalışma, kavramsal-teorik bir araştırma stratejisi izlemekte ve üç aşamadan oluşmaktadır. İlk aşamada dört iktisadi perspektif arasındaki tamamlayıcılık ilişkileri kavramsal bütünleştirme yaklaşımıyla tartışılmakta; ikinci aşamada bu perspektif mekanizma odaklı bir analiz stratejisiyle dört iktisadi süreç üzerinden işletilmekte; üçüncü aşamada ise Holmström ve Milgrom'un çoklu görev asil-vekil modeli, görev belirsizliği parametresini içerecek biçimde genişletilerek analitik temel oluşturulmakta ve sayısal simülasyonlarla desteklenmektedir. Bu üç aşamalı yapı, hibrit çalışmanın üretkenlik etkilerinin, kurucu mekanizmaları farklı teorik geleneklerin alanına düşen ve bu nedenle tek bir iktisadi modelle yeterince kavranması güç olan çok katmanlı niteliğine yanıt vermek üzere kurgulanmıştır.

Kavramsal çerçeve, görev belirsizliğinin firma üretkenliğini dört ekonomik kanal üzerinden etkilediğini öne sürmektedir. Birincisi, çalışanın görev önceliklerini belirleyebilmek için zaman harcamasına neden olan bilgi arama maliyetleridir; hibrit rejimde asenkron iletişim platformları üzerinden gerçekleşen bilgi edinme süreçleri hem çalışan hem de yönetici cephesinde verim kaybına neden olmaktadır. İkincisi, çalışanın karar yetkisinin sınırlarını net kavrayamadığı durumlarda kararı yöneticiye taşımasıyla biriken karar gecikmeleridir; bu durum özellikle yoğun karar veren orta kademe yönetimde belirgin bir darboğaz oluşturur. Üçüncüsü, çalışanın üretiminin yöneticinin beklediği çıktıyla örtüşmemesinden kaynaklanan ex-post yeniden müzakere maliyetleridir; hibrit rejimde sapmaların geç fark edilmesi revizyon yükünü ağırlaştırmaktadır. Dördüncüsü, bu üç maliyetin toplam etkisiyle yükselen efektif çaba maliyetidir; çalışanın aynı düzeyde performans gösterebilmek için katlandığı bilişsel ve psikolojik yük artmaktadır. Genel çerçevede ayrıca Türkiye işgücü piyasasının üç boyutlu özgüllüğünü de tartışmaktadır: uzaktan çalışmanın arz ile talep arasındaki belirgin açık, performansa dayalı ücret yazınının sınırlılığı ve istihdam sözleşmelerinin nispeten eksik niteliği. Söz konusu kurumsal özellikler, hibrit rejime geçişin gelişmiş ekonomilere kıyasla Türk firmalarında daha yüksek uyum maliyetleri doğurması ihtimalini güçlendirmektedir.

Formel modelde çalışan, gözlemlenebilir ve gözlemlenemeyen iki görev arasında çaba dağılımı yapmaktadır. Görev belirsizliği parametresi modele dahil edildiğinde, çalışanın gözlemlenemeyen göreve ayırdığı çabanın köşe çözümde sıfıra indiği; gözlemlenebilir göreve ayrılan çabanın ise belirsizlik arttıkça düştüğü görülmektedir. Modelin en kritik bulgusu, görev belirsizliğinin teşvik problemine dönüşme mekanizmasına ilişkindir: belirsizlik modele yalnızca maliyet kanalından girmekte, çabanın marjinal maliyetini yükseltmekte ve optimal teşvik yoğunluğu risk, ölçüm gürültüsü ve maliyet eğriliğinin çarpımına bağlı olduğundan, verili gürültünün teşvik söndürücü etkisini büyütmektedir. Ölçüm teknolojisinin kendisi belirsizlikten etkilenmediği hâlde, optimal sözleşme formülünde görev belirsizliğindeki artış etkin gürültü yükündeki oransal bir artışa gözlemsel olarak eşdeğerdir; görev belirsizliği bu anlamda risk-eşdeğeri bir faktör olarak işlemektedir. Bu sonuç, firmaların hibrit geçişte yaşanan üretkenlik kayıplarını yalnızca teşvik yoğunluğunu artırarak telafi edemeyeceğini ortaya koymaktadır. Karşılaştırmalı statik analizler, teşvik yoğunluğunun marjinal etkisinin görev belirsizliği arttıkça zayıfladığını göstermekte; bu da yüksek belirsizlik altındaki firmalarda performansa dayalı ücret artışlarının beklenen üretkenlik etkisini üretmediğine işaret etmektedir. Sayısal simülasyonlar, görev belirsizliği parametresindeki orta düzeyde artışların bile denge çabasını ve firma kârını doğrusal olmayan biçimde, oldukça yüksek oranlarda düşürdüğünü ortaya koymaktadır. Modelin endojen görev tasarımı uzantısı ise firmanın görev belirsizliğini yatırım yoluyla azaltabileceğini ve bu yatırımın gözetim

gürültüsü, çalışanın risk kaçınma düzeyi ve görevin firma değerine katkısıyla pozitif ilişki içinde olduğunu göstermektedir.

Çalışma, bulgular üzerine inşa edilen üç düzeyli bir politika seti önermektedir: görev tasarımı düzeyinde iş tanımlarının dinamik bir sözleşmesel araca dönüştürülmesi; gözetim teknolojisi düzeyinde doğru gözlemi önceleyen dengeli dijital sistemlerin tasarlanması ve teşvik düzeyinde çoklu görev mantığıyla uyumlu, takım temelli unsurları da içeren istikrarlı ücret yapılarının kurulması. Çalışma ayrıca ileride ampirik olarak sınanabilecek dokuz önerme sunmakta ve formel bir model çıkarımı olmaktan ziyade kurumsal bulgulara dayanan yorumsal bir uzantı olarak, özellikle Türkiye gibi sözleşme eksikliğinin belirgin olduğu işgücü piyasalarında mekanizmaların daha yoğun işleyeceğini öne sürmektedir. Söz konusu önermeler; firma düzeyinde panel veri analizinden firma içi saha deneylerine, yapısal eşitlik modellemesinden uluslararası karşılaştırmalı çalışmalara uzanan çeşitli ampirik stratejilerle test edilebilecek niteliktedir. Sonuç olarak hibrit çalışmaya geçişte yaşanan üretkenlik kayıplarının yalnızca teknolojik altyapı sorunu olarak değil, firma içi sözleşme rejiminin yeniden tasarlanması gereken yapısal bir mesele olarak ele alınması gerekmektedir.

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