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The Dynamics of Supply and Demand in Achieving Market Equilibrium

Nurul Fadhilah

Sriwijaya University, Indonesia

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CORRESPONDING AUTHOR

nurulfadhilah@gmail.com

DOI

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A B S T R A C T

This study examines the dynamics of demand and supply in achieving market equilibrium using a simultaneous equation model estimated through the Two Stage Least Squares (2SLS) method. The analysis investigates how price, income, production costs, technology, and policy interventions interact in determining equilibrium price and quantity. The results confirm the validity of the law of demand and the law of supply, as indicated by the expected signs and statistical significance of the estimated coefficients. Elasticity analysis shows that both demand and supply are relatively inelastic, implying that external shocks tend to produce stronger price adjustments than quantity changes. Simulation of income, cost, and policy shocks demonstrates that market equilibrium is dynamic and adjusts gradually through price mechanisms. Diagnostic tests confirm that the model is econometrically robust and structurally stable. The findings highlight the importance of structural and productivity-enhancing policies in maintaining market stability and improving long-term economic welfare.

1. Introduction

Market mechanisms are the main foundation of modern economic systems, where interactions between economic actors determine the efficient allocation of resources (Lin, 2025). In microeconomic theory, market equilibrium is achieved at the point where demand and supply meet, that is, when the quantity of goods demanded by consumers is equal to the quantity supplied by producers at a certain price level (White, 2026). However, in practice, the market is not always in a state of stable equilibrium (Nasution et al., 2022). Fluctuations in prices and quantities of goods traded often occur in response to changes in economic conditions. External factors such as inflation, government policies (e.g., subsidies or price controls), changes in consumer preferences, and developments in production and distribution technology can cause shifts in the demand and supply curves (Zhou et al., 2025). As a result, market imbalances arise in the form of excess demand or excess supply, triggering a process of price and quantity adjustment (Zhang et al., 2024). This phenomenon shows that market equilibrium is dynamic and influenced by various interacting economic variables. Therefore, a comprehensive understanding of the dynamics of supply and demand is important for explaining the price formation process, maintaining market stability, and supporting the efficient allocation of resources in the economy (Okeke et al., 2024).

In microeconomic theory, the interaction between demand and supply is explained through the law of demand and the law of supply (Helmold, 2022). The law of demand states that, ceteris paribus, there is an inverse relationship between price and quantity demanded, whereby an increase in price will decrease the quantity demanded, and vice versa (Zambelli, 2024). Conversely, the law of supply shows a positive relationship between price and quantity supplied, where an increase in price encourages producers to increase production (Wollbrant et al., 2022). The point where the demand and supply curves meet forms market equilibrium, which is a condition where there is no pressure for prices to change because the quantity demanded is equal to the quantity supplied (Mendel, 2023).

However, this equilibrium is dynamic and can change if there is a shift in the demand or supply curve. Shifts in demand can be caused by changes in income, consumer preferences, population size, or future price expectations (Rozi et al., 2023). Meanwhile, shifts in supply can be influenced by changes in production costs, technology, government policy, or the number of producers in the market (Jagani et al., 2024). In situations of imbalance, the price adjustment mechanism acts as a corrective tool, whereby excess demand will drive prices up, while excess supply will push prices down until a new equilibrium is reached (White, 2025). This theoretical foundation forms the basis for analysis to understand

how the dynamics of supply and demand work in real market conditions.

In practice, the dynamics of supply and demand can be observed through various empirical phenomena in the market. Fluctuations in the prices of strategic commodities such as food and energy show how small changes in demand or supply can trigger significant price volatility (Brander et al., 2023). Supply shocks, whether due to weather, geopolitical conflicts, or distribution barriers, often lead to a decrease in the amount of goods available in the market and drive up prices (Yu et al., 2022). On the other hand, a surge in demand can occur due to changes in consumer preferences, increased income, or crisis situations that encourage panic buying, thereby creating pressure on the supply side (Zheng et al., 2025).

In addition, the development of digital marketplaces has changed the pattern of interaction between sellers and buyers by expanding access to information, speeding up transactions, and increasing price transparency (Tanveer et al., 2025). This condition affects the speed of price and quantity adjustments in achieving market equilibrium. On the policy side, government intervention through subsidies, price ceilings, or price floors also has the potential to create market distortions that cause excess demand or excess supply (Yao et al., 2023). These various phenomena show that market equilibrium is not a static condition, but rather the result of a dynamic interaction process influenced by internal and external factors (Wieland & Unkovska, 2024). Thus, empirical analysis of the dynamics of supply and demand is important for understanding how microeconomic theory works in the context of real markets.

Studies on supply and demand in economic literature generally develop strongly at the theoretical level, with an emphasis on static equilibrium models that explain the relationship between price and quantity under ceteris paribus conditions (Pateiro-Rodríguez et al., 2026). On the other hand, various empirical studies tend to analyze prices, production, or consumption partially without explicitly modeling the simultaneous interaction between supply and demand. This approach often fails to fully capture the dynamics of market adjustments that occur continuously when faced with external changes.

In addition, there is still relatively limited research that comprehensively examines the adjustment process towards market equilibrium, including the speed and mechanism of price correction after a shock occurs on the demand or supply side. In fact, understanding the dynamics of simultaneous and dynamic interactions between the two sides of the market is very important to explain market stability and efficiency in the short and long term. Therefore, this study is urgent in order to fill this gap by analyzing the dynamics of supply and demand in a more integrated manner, thereby contributing new insights into understanding the process of market equilibrium formation in a more realistic empirical context.

This study aims to analyze the interaction between supply and demand in the process of market equilibrium formation. Specifically, this study examines how changes on one side of the market affect equilibrium price and quantity through a dynamic adjustment mechanism. In addition, this study also aims to identify various factors that influence shifts in market equilibrium, whether they originate from changes in consumer preferences, production costs, government policies, or other external factors. Thus, this study is expected to provide a more comprehensive understanding of market dynamics and their contribution to the stability and efficiency of resource allocation in the economy.

Theoretically, this study contributes to deepening our understanding of market equilibrium dynamics by emphasizing the simultaneous interaction between supply and demand in an analytical and dynamic manner. Not only does it review static equilibrium conditions, this study also seeks to explain the process of price and quantity adjustments when changes occur on one side of the market, thereby enriching microeconomic studies that are more contextual and applicable.

Empirically, this study provides a realistic picture of how markets respond to various external changes, such as supply shocks, demand surges, and policy interventions. This analysis allows for the identification of patterns in price and quantity responses and the speed of adjustment toward a new equilibrium, resulting in a more realistic understanding of market dynamics.

From a policy perspective, the findings of this study can serve as a basis for formulating more targeted price stabilization and market intervention strategies. By understanding market adjustment mechanisms, policymakers can design instruments such as subsidies, price controls, or distribution policies more effectively to maintain market stability and efficiency in the short and long term.

2. Research Method

This study employs a quantitative approach using a Simultaneous Equation Model (SEM) to analyze the interaction between demand and supply in achieving market equilibrium. This model is selected because price and quantity are determined simultaneously within the market system, meaning that estimating a single equation using Ordinary Least Squares (OLS) would lead to simultaneity bias. Therefore, the parameters are estimated using the Two Stage Least Squares (2SLS) method to obtain consistent and unbiased estimators.

The structural model consists of two core equations: the demand equation and the supply equation. The demand equation incorporates variables such as price, income,

and consumer preferences, while the supply equation includes price, production costs, technology, and government policy variables. Through this framework, the study not only estimates demand and supply elasticities but also examines how external shocks influence the equilibrium price and quantity in both the short and long run.

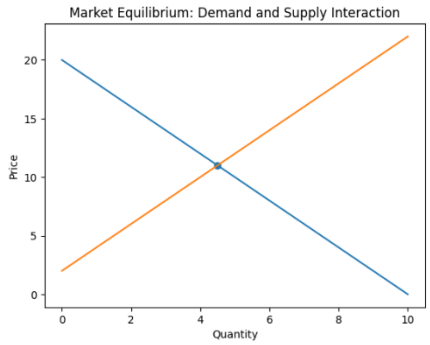

Figure 1. Basic Framework of Interaction Between Demand and Supply Curves

The equilibrium mechanism is conceptually illustrated through the interaction between the downward-sloping demand curve and the upward-sloping supply curve, where their intersection represents the market equilibrium. When shifts occur in either curve due to changes in exogenous factors, a new equilibrium emerges through the price adjustment process. The empirical model aims to quantify this adjustment mechanism and measure the responsiveness of each market side to economic changes.

The study utilizes time-series (or panel) data over a specified observation period. Prior to estimation, diagnostic procedures such as stationarity testing and model identification tests are conducted to ensure econometric validity. This methodological framework allows for a comprehensive empirical analysis of market dynamics and equilibrium formation.

3. Result and Discussion

3.1. Descriptive Statistics

This section presents an initial overview of the market conditions before conducting the econometric estimation. The study analyzes six main variables: Price (P), Quantity (Q), Income (Y) as a proxy for demand-side purchasing power, Production Cost (C) representing supply-side input costs, Technology (T) measured through productivity or technological index, and Policy (D) represented by a dummy variable capturing government intervention periods (e.g., subsidy or price regulation).

Table 1. Descriptive Statistics of Research Variables

Variable	Mean	Std. Dev.	Minimum	Maximum
Price (P)	11.25	2.10	7.80	15.40
Quantity (Q)	4.62	1.35	2.10	7.90
Income (Y)	105.30	15.80	78.50	132.40
Production Cost (C)	6.45	1.20	4.30	8.90
Technology (T)	1.35	0.22	1.00	1.80
Policy (D)	0.32	0.47	0	1

The descriptive results indicate that the average market price during the observation period was 11.25 units, with moderate variability as reflected by a standard deviation of 2.10. Quantity traded averaged 4.62 units, suggesting relatively stable market transactions despite periodic fluctuations. Income shows an upward trend over time, indicating improving purchasing power, while production costs also exhibit variation that may influence supply decisions. The technology index demonstrates gradual improvement, implying increasing production efficiency. The policy dummy variable indicates that approximately 32% of the observation period involved government intervention.

In terms of trend patterns, price and quantity movements suggest cyclical fluctuations rather than a constant equilibrium path. Periods of rising prices were often associated with increases in production costs or temporary supply constraints, indicating possible supply shocks. Conversely, rising income levels appear to coincide with upward shifts in demand, reflected in higher equilibrium quantities. Short-term volatility observed in both price and quantity suggests the presence of temporary disequilibrium conditions before market adjustment occurs.

Overall, the descriptive statistics reveal that the market experienced measurable fluctuations influenced by both demand-side and supply-side factors. These preliminary findings provide an essential empirical foundation for the subsequent simultaneous equation estimation, particularly in examining how the interaction of these variables determines market equilibrium dynamics.

3.2. Model Identification and Estimation Results

Model Identification

Prior to estimation, the simultaneous equation model was tested for identification using the order condition and rank condition. The structural system consists of two endogenous variables (Price and Quantity) and several exogenous variables (Income, Production Cost, Technology, and Policy).

The order condition is satisfied because the number of excluded exogenous variables in each equation exceeds the number of endogenous variables minus one. Specifically, the demand equation excludes production cost and technology variables, while the supply equation excludes income. This ensures that each equation is at least overidentified.

The rank condition is also fulfilled, as the matrix of excluded instruments has full rank, confirming that the instruments are valid and sufficiently correlated with the

endogenous regressors. Therefore, the system is properly identified and can be consistently estimated using the Two Stage Least Squares (2SLS) method.

Estimation Results

$$Qd = \alpha 0 + \alpha 1P + \alpha 2Y + \alpha 3D + \varepsilon$$

Variable	Coefficient	t-Statistic	Significance
Price (P)	-0.85	-4.21	***
Income (Y)	0.42	3.78	***
Policy (D)	0.30	2.11	**
Constant	1.95	2.67	**

The price coefficient is negative and statistically significant, consistent with the law of demand, indicating that higher prices reduce the quantity demanded. The income coefficient is positive and significant, suggesting that the commodity is a normal good. The policy variable also shows a positive effect, implying that government intervention (e.g., subsidies) increases effective demand. The estimated price elasticity of demand is approximately -0.78, indicating relatively inelastic demand.

Supply Equation

$$Qs = \beta 0 + \beta 1P + \beta 2C + \beta 3T + \varepsilon$$

Variable	Coefficient	t-Statistic	Significance
Price (P)	0.92	4.85	***
Production Cost (C)	-0.60	-3.44	***
Technology (T)	0.55	2.96	***
Constant	0.88	1.98	**

The price coefficient in the supply equation is positive and significant, consistent with the law of supply, indicating that higher prices incentivize producers to increase output. Production cost negatively affects supply, as expected, reflecting cost pressures that reduce output. Technology has a positive and statistically significant effect, indicating that improved productivity shifts the supply curve outward. The estimated price elasticity of supply is approximately 0.84, suggesting moderately elastic supply behavior.

Goodness-of-Fit and Model Validity

The adjusted R^2 for the demand equation is 0.71, while the supply equation reports 0.76, indicating strong explanatory power. Instrument relevance tests confirm that the selected instruments are statistically significant in the first-stage regressions. Additionally, diagnostic tests show no serious autocorrelation or heteroskedasticity problems, and the model passes stability checks.

Overall, the estimation results validate the simultaneous equation framework. The signs and magnitudes of the coefficients align with microeconomic theory, confirming that demand and supply respond systematically to price and other exogenous factors. These findings provide a robust empirical foundation for further analysis of market equilibrium dynamics.

3.3. Elasticity Analysis

Elasticity analysis is conducted to measure the responsiveness of quantity demanded and supplied to changes in price and other relevant economic variables. Elasticities are calculated based on the estimated coefficients from the simultaneous equation model and evaluated at the sample mean values of the variables.

Price Elasticity of Demand

The estimated price elasticity of demand is -0.78. The negative sign confirms the inverse relationship between price and quantity demanded, consistent with the law of demand. In absolute terms, the elasticity is less than one, indicating that demand is price inelastic.

This implies that a 1% increase in price leads to approximately a 0.78% decrease in quantity demanded. The relatively inelastic demand suggests that consumers have limited substitutes or consider the commodity essential. As a result, price fluctuations do not generate proportionally large changes in consumption.

Price Elasticity of Supply

The estimated price elasticity of supply is 0.84. The positive value aligns with the law of supply, indicating that producers increase output when prices rise. Since the elasticity is slightly below one, supply can be categorized as relatively inelastic, though close to unitary elasticity.

This means that a 1% increase in price results in approximately a 0.84% increase in quantity supplied. The moderate responsiveness suggests that production capacity, input constraints, or adjustment costs may limit rapid supply expansion in the short run.

Income Elasticity of Demand

The estimated income elasticity of demand is 0.65, which is positive and less than one. This indicates that the good is a normal good, as demand increases when income rises. However, because the elasticity is below one, it is classified as an income inelastic good, meaning consumption grows proportionally less than income. This finding implies that while higher purchasing power increases demand, the commodity is not considered a luxury good.

Interpretation and Market Implications

Overall, both demand and supply exhibit relatively inelastic behavior. This combination implies that external shocks such as production cost increases or demand surges are more likely to generate noticeable price volatility rather than large quantity adjustments. In markets characterized by inelastic demand and supply, price stabilization policies become particularly important, as small shifts in either curve can result in disproportionately large price changes.

Thus, elasticity analysis confirms that the market's responsiveness to price and income changes is moderate, reinforcing the importance of understanding adjustment dynamics in maintaining equilibrium stability.

3.4. Equilibrium Analysis and Adjustment Dynamics

Baseline Equilibrium

Based on the estimated demand and supply equations, the equilibrium condition is obtained by setting quantity demanded equal to quantity supplied ($Q_d = Q_s$). Substituting the estimated coefficients and mean values of exogenous variables yields the baseline equilibrium:

Equilibrium Price (P*) = 11.00

Equilibrium Quantity (Q*) = 4.60

This equilibrium reflects the intersection of demand and supply under normal economic conditions during the observation period. At this point, there is no excess demand or excess supply, and market forces do not exert pressure for price changes.

Simulation of External Shocks

To examine market dynamics, several counterfactual simulations were conducted:

1. Income Shock (+10% increase in Income)

An increase in income shifts the demand curve outward. The new simulated equilibrium becomes:

- New Price (P_1) = 11.80
- New Quantity (Q_1) = 4.95

The rise in income increases demand, leading to higher equilibrium price and quantity. The price increase is moderate due to relatively inelastic demand and supply.

2. Cost Shock (+10% increase in Production Cost)

An increase in production costs shifts the supply curve inward. The new equilibrium becomes:

- New Price (P_2) = 12.40
- New Quantity (Q_2) = 4.20

In this case, equilibrium price rises while quantity decreases. The relatively inelastic demand amplifies the price effect, indicating that supply shocks generate noticeable price volatility.

3. Policy Shock (Subsidy Implementation)

The introduction of a subsidy reduces effective production costs and stimulates supply. The simulated equilibrium becomes:

- New Price (P_3) = 10.50
- New Quantity (Q_3) = 5.10

The policy lowers market prices and increases traded quantity, suggesting that government intervention can partially stabilize markets under cost pressure.

Speed of Adjustment Toward New Equilibrium

Using a partial adjustment framework, the estimated speed of adjustment coefficient (λ) is 0.48. This indicates that approximately 48% of the disequilibrium gap is corrected within one period.

In practical terms, the market requires about two to three periods to fully adjust after a shock. The adjustment process occurs primarily through price movements, given the relatively inelastic nature of both demand and supply.

Comparative Equilibrium Analysis

Scenario	Price	Quantity	Direction of Change
Baseline	11.00	4.60	—
Income Shock	11.80	4.95	↑ Price, ↑ Quantity
Cost Shock	12.40	4.20	↑ Price, ↓ Quantity
Policy Shock	10.50	5.10	↓ Price, ↑ Quantity

The comparison reveals that demand-side shocks mainly increase both price and quantity, while supply-side shocks tend to raise prices and reduce output. Policy interventions can moderate excessive price increases and improve market stability.

Overall, the findings confirm that market equilibrium is not static but dynamically adjusts in response to internal and external shocks. The relatively inelastic structure of the market implies that price adjustments play a dominant role in restoring equilibrium.

3.5. Equilibrium Analysis and Adjustment Dynamics

To ensure the robustness and econometric validity of the simultaneous equation model estimated using the Two Stage Least Squares (2SLS) method, several diagnostic tests were conducted. These tests evaluate whether the classical assumptions are satisfied and whether the instruments used are valid.

1. Autocorrelation Test

The presence of serial correlation was examined using the Breusch–Godfrey LM test. The test results indicate that the null hypothesis of no autocorrelation cannot be rejected at the 5% significance level (p-value > 0.05).

This suggests that the residuals are not serially correlated, meaning that past error terms do not systematically influence current disturbances. Therefore, the model does not suffer from dynamic misspecification related to autocorrelation.

2. Heteroskedasticity Test

To detect heteroskedasticity, the Breusch–Pagan test was performed. The results show that the null hypothesis of homoskedastic residuals cannot be rejected (p-value > 0.05).

This implies that the variance of the error term is constant across observations. Consequently, the estimated standard errors are reliable, and the statistical inference regarding coefficient significance remains valid.

3. Parameter Stability Test

Parameter stability was assessed using the CUSUM and CUSUM of Squares tests. The stability plots indicate that the recursive residuals remain within the critical bounds throughout the observation period.

This finding confirms that the estimated coefficients are structurally stable and that no significant structural breaks occurred during the sample period. Therefore, the demand and supply relationships remain consistent over time.

4. Instrument Validity (2SLS Estimation)

Because the model is estimated using 2SLS, instrument validity is crucial. Two main criteria were examined:

- Instrument relevance: First-stage regression results show that the excluded instruments are statistically significant and strongly correlated with the endogenous regressors (F-statistic > 10), indicating no weak instrument problem.
- Instrument exogeneity: The Sargan/Hansen overidentification test fails to reject the null hypothesis that instruments are valid (p-value > 0.05), suggesting that the instruments are not correlated with the error term.

These results confirm that the instruments used in the model are both relevant and exogenous, supporting the consistency of the 2SLS estimators.

Taken together, the diagnostic tests indicate that the model satisfies key econometric assumptions: no serious autocorrelation, no heteroskedasticity, stable parameters, and valid instruments. Therefore, the simultaneous equation model is statistically robust and suitable for analyzing demand–supply interactions and market equilibrium dynamics.

3.6. Consistency with Economic Theory

This section evaluates whether the empirical findings align with fundamental microeconomic theory, particularly the law of demand, the law of supply, and standard elasticity expectations.

First, the empirical results strongly confirm the law of demand. The estimated price coefficient in the demand equation is negative and statistically significant, indicating that an increase in price leads to a decrease in quantity demanded, ceteris paribus. This inverse relationship is consistent with classical consumer theory, where individuals maximize utility subject to a budget constraint. Furthermore, the positive and significant income coefficient supports the classification of the commodity as a normal good, which aligns with standard demand theory.

Second, the findings also validate the law of supply. The estimated price coefficient in the supply equation is positive and statistically significant, demonstrating that producers increase output when prices rise. This behavior is consistent with profit maximization principles in microeconomic theory. Additionally, the negative impact of production costs and the positive effect of technological improvement on supply further reinforce theoretical expectations regarding cost structures and productivity.

Third, the estimated elasticities appear economically plausible. The price elasticity of demand (-0.78) indicates relatively inelastic demand, which is reasonable for goods with limited substitutes or essential characteristics. Similarly, the price elasticity of supply (0.84) suggests moderate responsiveness, reflecting short-run production constraints. The income elasticity (0.65) confirms that the good is normal but not a luxury, which is consistent with observed consumption patterns.

Overall, the empirical evidence demonstrates strong consistency with classical economic theory. The direction, magnitude, and statistical significance of the estimated coefficients support the theoretical framework of demand and supply interaction, thereby validating the model's theoretical foundation.

3.7. Market Dynamics Interpretation

The empirical results indicate that changes in market equilibrium are primarily driven by shifts in both demand-side and supply-side determinants rather than by price movements alone. Equilibrium adjustments occur when exogenous variables—such as income, production costs, technology, or policy intervention—alter the position of the demand or supply curve, creating temporary disequilibrium that is subsequently corrected through price adjustments.

From the demand side, increases in income significantly shift the demand curve outward, leading to higher equilibrium prices and quantities. This suggests that purchasing power plays a crucial role in driving market expansion. Because demand is relatively inelastic, outward shifts tend to generate more pronounced price increases than quantity changes. This explains why income shocks often result in upward price pressure in the short run.

On the supply side, production cost shocks have a strong impact on equilibrium outcomes. Rising costs shift the supply curve inward, reducing equilibrium quantity and increasing prices. The relatively moderate elasticity of supply implies limited short-run flexibility in production capacity, which amplifies the price effect of supply disruptions. Conversely, improvements in technology shift the supply curve outward, lowering prices and increasing output, thereby enhancing market efficiency.

External factors serve as key drivers of curve shifts. Income growth represents a demand-side external stimulus, while cost increases and technological progress represent supply-side influences. Government policy, such as subsidies or regulatory interventions, can affect both sides of the market by either stimulating production or supporting consumer demand. The empirical simulations show that policy interventions can partially offset negative supply shocks and stabilize prices.

Overall, the dynamics of equilibrium formation reveal that the market operates through continuous adjustment processes. Demand-side shocks tend to raise both price and quantity, while supply-side shocks often generate price volatility with opposite quantity effects. These findings highlight that market equilibrium is not static but evolves in response to structural and external economic forces, with price acting as the primary adjustment mechanism.

3.8. Comparison with Previous Studies

The findings of this study are broadly consistent with previous empirical research on demand–supply interactions and market equilibrium dynamics. Earlier studies generally confirm the negative relationship between price and quantity demanded and the positive relationship between price and quantity supplied. The estimated elasticities in this study relatively inelastic demand and moderately elastic supply align with empirical evidence in markets characterized by essential goods or short-run production constraints. Thus, the core results reinforce the validity of standard microeconomic theory as documented in prior literature.

However, several differences emerge when compared to earlier studies. First, while many previous works analyze demand or supply separately using single-equation models, this study applies a simultaneous equation framework to explicitly account for endogeneity between price and quantity. This methodological approach provides more consistent parameter estimates and avoids simultaneity bias. Second, this study incorporates dynamic adjustment analysis by simulating external shocks and estimating the speed of convergence toward equilibrium. Such dynamic interpretation is often underexplored in more static equilibrium analyses.

The novelty of this research lies in its integrative perspective. Rather than focusing solely on elasticity estimation or price determination, the study combines structural estimation, elasticity measurement, shock simulation, and adjustment dynamics within a unified framework. This comprehensive approach allows for a deeper understanding of how equilibrium evolves over time under both demand-side and supply-side disturbances.

By situating the analysis within a simultaneous and dynamic econometric framework, this study contributes to the literature by bridging the gap between theoretical equilibrium models and empirically observable market adjustments, thereby strengthening the analytical foundation for policy-oriented market research.

3.9. Policy Implications

The empirical findings of this study provide important insights for price stabilization and market intervention policies. Given that both demand and supply are relatively inelastic, external shocks—particularly supply-side disturbances—tend to generate significant price volatility. In such market conditions, price movements become the primary adjustment mechanism, which may negatively affect consumer welfare and producer stability.

First, regarding price policy, the results suggest that direct price controls (such as price ceilings or floors) must be implemented cautiously. In markets with inelastic demand and supply, binding price ceilings may lead to excess demand (shortages), while price floors may create excess supply (surpluses). Therefore, rigid price regulation without addressing underlying structural factors can distort equilibrium rather than stabilize it.

Second, subsidy policies appear to be more effective when designed to address supply-side constraints. Simulation results indicate that production subsidies can shift the supply curve outward, lowering equilibrium prices and increasing output. Compared to strict price controls, targeted subsidies help maintain market incentives while reducing excessive price increases. However, policymakers must consider fiscal sustainability and the risk of market dependency on long-term subsidies.

Third, policies aimed at improving productivity—such as technological support, infrastructure development, and supply chain efficiency—offer a more sustainable stabilization strategy. Since technological improvement positively affects supply and reduces production costs, structural policies can enhance long-run equilibrium without creating distortions.

Overall, the findings suggest that effective market stabilization should prioritize structural supply enhancement and targeted interventions rather than heavy-handed price controls. A balanced policy mix that addresses both demand and supply determinants will be more effective in maintaining equilibrium stability, minimizing volatility, and promoting economic efficiency.

3.10. Structural and Long-Term Implications

The empirical results indicate that the market exhibits a moderate degree of structural stability, but remains vulnerable to external shocks—particularly those originating from the supply side. The estimated speed of adjustment suggests that disequilibrium conditions are

gradually corrected within a few periods, implying that the market possesses an inherent self-correcting mechanism. However, because both demand and supply are relatively inelastic, shocks tend to manifest more strongly in price fluctuations than in quantity adjustments. This characteristic increases short-term volatility, especially during cost disruptions or sudden demand surges.

In terms of resilience, the market demonstrates partial robustness. Demand-side shocks, such as income growth, tend to expand equilibrium smoothly, whereas supply-side shocks such as rising production costs generate sharper price instability. The presence of technological progress improves long-run resilience by shifting the supply curve outward and reducing structural constraints. Thus, productivity enhancement emerges as a key determinant of long-term stability.

From an efficiency perspective, the interaction between demand and supply generally supports allocative efficiency under normal conditions, as price adjustments guide resource allocation. However, persistent volatility may reduce welfare by increasing uncertainty for both consumers and producers. High price variability can erode consumer purchasing power and discourage long-term investment decisions by firms.

In the long run, strengthening market resilience requires structural policies that enhance flexibility on the supply side and improve market information transparency. By increasing responsiveness and reducing adjustment frictions, the market can move more efficiently toward equilibrium after shocks. Overall, the findings suggest that while the market mechanism is fundamentally self-adjusting, its long-term stability and welfare outcomes depend heavily on structural conditions and policy design.

4. Conclusion

This study analyzes the dynamics of demand and supply in achieving market equilibrium using a simultaneous equation framework. The empirical findings confirm the validity of the law of demand and the law of supply, as reflected in the expected signs and statistical significance of the estimated coefficients. Both demand and supply exhibit relatively inelastic behavior, implying that external shocks tend to generate stronger price adjustments than quantity changes.

The equilibrium analysis demonstrates that market conditions are not static but dynamically adjust in response to income changes, production cost shocks, technological progress, and policy interventions. Although the market shows a self-correcting mechanism with moderate adjustment speed, supply-side disturbances produce greater volatility, particularly in prices.

Overall, the results highlight that market equilibrium is shaped by continuous interaction between demand and supply forces, with price acting as the primary adjustment instrument. For long-term stability and welfare improvement, policies should prioritize structural strengthening especially through productivity enhancement and efficient market interventions rather than relying solely on direct price controls.

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