PANEL DATA ANALYSIS OF ASIAN ECONOMIC CRISIS FROM MONETARY AND FISCAL POLICY POINT OF VIEW

ANALISIS DATA PANEL KRISIS EKONOMI ASIA DARI PERSPEKTIF KEBIJAKAN MONETER DAN FISKAL

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ABSTRACT
The Asian Economic Crisis of 1997–1998 stands as one of the most significant financial crises in the modern economic history. This research aims to revisit the Asian Economic Crisis through the dual frameworks of monetary and fiscal policy by applying a quantitative panel data methodology to assess the interactions between monetary and fiscal policy tools and key macroeconomic indicators across selected East and Southeast Asian economies. This study is motivated by the scientific need to understand how macroeconomic policy coordination shaped the trajectory of the crisis and its aftermath. This research applies a panel data regression model covering eight Asian countries including Indonesia, Thailand, South Korea, Malaysia, Philippines, Singapore, Hong Kong, and Japan during the period of 1995 to 2005. The study operates under a set of theoretical propositions grounded in monetary theory, fiscal theory, and business cycle theory. The hypothesis explores whether the monetary and fiscal policy has anything to do with the Asian Economic Crisis taking the role as the cause or the means of crisis mitigation. This proposition is tested using macroeconomic panel data indicators such as interest rates, M2 aggregates, inflation, exchange rates, government spending, taxation, and current account balances, analyzed through fixed and common effect regression models. Beyond its empirical contributions, the study also offers theoretical implications by revisiting key assumptions in monetary and fiscal theory in the context of open economies subject to volatile capital flows. The findings underscore the importance of institutional strength, policy credibility, and adaptive governance in managing macroeconomic crises. In summary, this research not only provides empirical validation for prevailing macroeconomic theories but also offers practical policy insights into how fiscal and monetary tools can be effectively coordinated in times of systemic crisis. Its contribution to science lies in its integrated methodological approach, its regionally comparative lens, and its relevance for contemporary policy challenges in an era of growing financial interconnectedness.
Keywords*: Macroeconomics, Economy, Asian Economic Crisis, Economic Crisis, Panel Data, East Asia, Southeast Asia, Monetary Theory, monetary policy, Fiscal Theory, fiscal policy, Business Cycle Theory.*

ABSTRAK
Krisis Ekonomi Asia 1997–1998 merupakan salah satu krisis keuangan paling signifikan dalam sejarah ekonomi modern. Penelitian ini bertujuan untuk mengkaji kembali Krisis Ekonomi Asia melalui kerangka ganda kebijakan moneter dan fiskal dengan menerapkan metodologi data panel kuantitatif untuk menganalisis interaksi antara alat-alat kebijakan moneter dan fiskal dengan indikator makroekonomi kunci di sejumlah ekonomi Asia Timur dan Tenggara. Penelitian ini didorong oleh kebutuhan ilmiah untuk memahami bagaimana koordinasi kebijakan makroekonomi membentuk jalannya krisis dan dampaknya. Penelitian ini menerapkan model regresi data panel yang mencakup delapan negara Asia, termasuk Indonesia, Thailand, Korea Selatan, Malaysia, Filipina, Singapura, Hong Kong, dan Jepang, selama periode 1995 hingga 2005. Studi ini beroperasi berdasarkan serangkaian proposisi teoretis yang didasarkan pada teori moneter, teori fiskal, dan teori siklus bisnis. Hipotesis ini mengeksplorasi apakah kebijakan moneter dan fiskal memiliki peran sebagai penyebab atau alat mitigasi krisis. Proposisi ini diuji menggunakan indikator data panel makroekonomi seperti suku bunga, agregat M2, inflasi, nilai tukar, pengeluaran pemerintah, perpajakan, dan neraca transaksi berjalan, yang dianalisis melalui model regresi efek tetap dan efek bersama. Selain kontribusi empirisnya, studi ini juga menawarkan implikasi teoretis dengan meninjau kembali asumsi kunci dalam teori moneter dan fiskal dalam konteks ekonomi terbuka yang terpapar aliran modal yang volatil. Temuan ini menyoroti pentingnya kekuatan institusional, kredibilitas kebijakan, dan tata kelola adaptif dalam mengelola krisis makroekonomi. Secara ringkas, penelitian ini tidak hanya memberikan validasi empiris bagi teori makroekonomi yang berlaku, tetapi juga menawarkan wawasan kebijakan praktis tentang bagaimana alat fiskal dan moneter dapat dikoordinasikan secara efektif dalam masa krisis sistemik. Kontribusinya terhadap ilmu pengetahuan terletak pada pendekatan metodologis

INTRODUCTION

Economic crises have long become the focus of economists, scholars, and policymakers due to their impact on national and global economy. From the Great Depression of the 1930s to the more recent crisis, each crisis has challenged prevailing economic theories and policies. The Great Depression, triggered by the 1929 U.S. stock market collapse, was marked by credit overexpansion, banking failures, and protectionist policies that crippled global trade (Ardan, 2023; Glasner, 2021). Despite emergency interventions such as the New Deal and public works programs, it was the economic mobilization during World War II that finally ended the crisis (de Beaufort Wijnholds, 2020).

Subsequent decades brought new forms of instability. The 1970s stagflation era which is characterized by skyrocketing inflation and high levels of unemployment, revealed the limitations of Keynesianism and led to the rise of monetarist views (Phillips, 1958; Lepie, 2019). The oil shocks of 1973 and 1979, coupled with U.S. monetary policy missteps, worsened global inflation. In response, Paul Volcker's aggressive rate hikes in the early 1980s stabilized prices but triggered a recession (Murphy, 2021). The 1980s also witnessed the Latin American debt crisis that was fueled by excessive borrowing and rising Federal Reserve's interest rates. IMF-led bailouts have caused deep recessions through austerity and structural reforms (Ocampo, 2013; Zakhartsova, 2023).

From 1995 to 2000, the dot-com bubble has underscored the risks of speculative investment. Despite massive losses and tech-sector layoffs after the 2000 crash, the era laid digital foundations for firms like Amazon and Google (Goldfarb et al., 2007; Wu, 2010). In 1997, East and Southeast Asia were once praised for its rapid growth were suddenly plunged into a crisis. Structural vulnerabilities such as local currency pegs to the US dollar, weak financial regulations, and overreliance on short-term capital inflows contributed to financial collapse (Bank of Thailand, 2022; Grimes, 2015). Massive capital flight followed speculative attacks in Thailand, lead to deep recessions and political upheaval all across the East and Southeast Asia. While most of the countries turned to the IMF for economic support, Malaysia's capital controls resulted in a less severe economic downturn (Chirathivat, 2007).

Ten years later, the 2008 Global Financial Crisis triggered a broader systemic collapse. Caused by subprime property lending and poorly regulated financial instruments, the crisis wiped out nearly $20 trillion in global output and forced governments to implement extraordinary fiscal and monetary responses (Claessens et al., 2010; Acharya & Richardson, 2009). In its aftermath, regulatory reforms such as Dodd-Frank and Basel III aimed to strengthen financial oversight, though rising inequality and sovereign debt remained pressing concerns (Saez & Zucman, 2014).

More recent events, such as the European Sovereign Debt Crisis and the COVID-19 Recession, further exposed the global economic vulnerabilities. The former revealed the pitfalls of monetary union without fiscal coordination, while the latter underscored the effectiveness

of coordinated stimulus efforts in crisis management (Wyplosz, 2013; European Commission, 2020). Both crises emphasized the need for resilient institutions and proactive policymaking.

Based on the past economic crises, we can witness a recurring pattern of economic crisis started by asset bubble crash, outstanding debts, transmitted inflation, speculative attacks, and ended with government intervention by adjusting interest rate and government spending, which is compatible with monetary and fiscal policies. This study investigates the Asian Economic Crisis from a monetary and fiscal policy perspective, employing panel data analysis across East and Southeast Asian economies to examine the relationship between the macroeconomic indicators of Asian countries before, during, and after Asian Economic Crisis and the applied monetary and fiscal policy by each respective country. By examining macroeconomic variables from 1995 to 2005, this research evaluates the role of policy frameworks in both triggering and resolving the crisis. The findings contribute to ongoing debates in macroeconomic theory and policy design, offering insight into how emerging economies can better prepare for future systemic shocks.

From the introduction above, the research has the following questions: 1. How does the monetary and fiscal economic theories explain Asian Economic Crisis? 2. How does the monetary and fiscal policies interact with macroeconomic indicators of affected Asian countries? 3. What lessons can we learn from the crisis and what are the recommendations to prevent similar crisis in the future? From the research question, we can conclude the research objectives as such: To understand how Asian Economic Crisis works from

monetary and fiscal perspective, to understand the relationship between the tools of monetary and fiscal policy and macroeconomic indicators of affected Asian countries, and to understand the lessons learned from the crisis and provide recommendations for prevention of similar crisis.
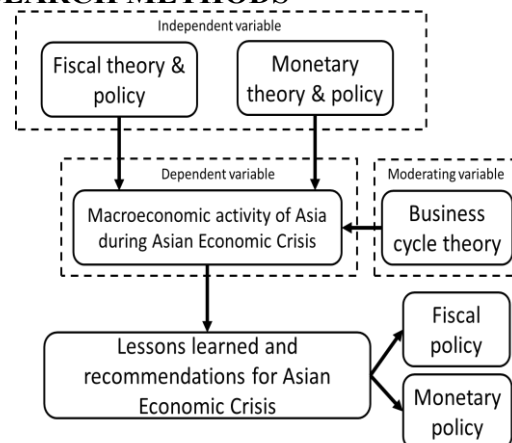
RESEARCH METHODS

Figure 1 - Conceptual Framework

This study adopts a quantitative research method while incorporating qualitative insights to enhance depth and context. The objective of this research is to analyze the causes and effect relationship between variables proposed in the conceptual framework. The research will use quantitative statistical data of Asian countries that were affected from the economic crisis from reputable and accessible secondary sources from World Bank's data bank and IMF's article IV reports. The data will be complemented from additional reputable sources such as Bank of International Settlement reports, Asian Development Bank annual reports, national central banks of respective East and Southeast Asian countries, and credible third-party financial organizations such as Federal reserve of St. Louis, Organization of Emerging Countries Development (OECD), PricewaterhouseCoopers (PwC), and KPMG.

The limitation for collecting data only include countries, affected by Asian Economic Crisis which includes ASEAN+3 countries (Brunei Darussalam, Cambodia, Indonesia, Lao PR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam) with the addition of PR China, Japan, dan South Korea. Although there are countries who were not greatly affected by Asian Economic Crisis such as Brunei Darussalam, Cambodia, Vietnam, and Myanmar due to the smaller size of their economy, highly reliant on agriculture and domestic demand, their investment composition was mostly consisted of long-term funding, and their less-developed financial system was creating insulation from global financial markets (Menon, 2021). Moreover, PR China also was not greatly affected by the crisis, but it was one of China's Special Administration Region of Hong Kong who were greatly hit by the crisis due to its economic activities mainly focuses on finance and international trade.

These quantitative data will be applied as the main research materials. The variables from the quantitative data in this research consists of independent variable, which is a variable that affects dependent variable when manipulated or changed by the researcher, this variable consist of monetary and fiscal policy such as annual interest rate, annual change in volume of money (M2), current account deficit relative to GDP, annual change in personal income tax rate and corporate tax rate (top marginal rate), and fiscal situation net lending/borrowing. The dependent variable consists of annual GDP growth, annual inflation rate, annual change in currency exchange rate, and annual unemployment rate, all of the dependent variables are macroeconomic indicators that were highly affected during Asian Economic Crisis and were influenced by the change in monetary and fiscal policy shift before, during, and after the crisis.

Panel data regression analysis will capture dynamic relationships between the independent and dependent variables. The decision for using panel data method was made based on the past research made by Knowles & Garces-Ozanne (2003) using panel data and cross-country comparison while the choice for independent dan dependent variable for research analysis based on multiple past research publication with the same theme such as Friedman (1968), Wray (2012), Cochrane (2001), Prescott (2016), Kim & Ratti (2006), Lim & Han (2003), and ADB (2010). Panel data analysis using data processing software STATA will be employed for regression analysis and to find the correlation and the relationship between macroeconomic data and the monetary and fiscal policy changes throughout 10 years of Asian Economic Crisis from 1995 to 2005 in 8 Asian countries such as Indonesia, Thailand, Malaysia, Singapore, South Korea, China, Japan, and the Philippines based on Taş' (2013) panel data regression analysis method on macroeconomic analysis. All of the variables in the STATA data processing software will be written in codes shown in the table 2

Before analyzing the macroeconomic indicators using panel data, it is important to test the data with several econometric tests, mainly the Chow test and the Hausman test to choose the suitable panel data regression model for analyzing the dependent variable relationship with independent variables

Table 1. Independent and dependent variables and its units

Code	Independent variable	Units

Code	Variable	Units
interest_r	Lending Interest rate	Percent
M2annual	Annual Change in Volume of money	Annual percentage change
deficit	Current account deficit	Percentage to GDP
pit_r	Personal Income Tax rate	Annual percent change
ct_r	Corporate Tax rate	Annual percent change
fiscal	Net lending/borrowing	Percentage to GDP
Code	Dependent variable	Units
gdp	Annual Gross Domestic Product growth	Annual percentage
Inflation_r	Annual inflation rate	Percent
cexannual	Annual change Currency exchange rate	Annual percentage change
unemployment_r	Unemployment rate	percent

The Chow test is used as a preliminary analysis between a common-effect model or fixed-effect model. If the p-value is resulted at lower than 0.05, it suggests heterogeneity in intercepts across time periods, supporting the fixed-effects approach. Conversely, if the test showed an p-value resulted at higher than 0.05, a pooled OLS or also known as common-effect model is considered appropriate. This helps ensure that the estimation strategy accounts for crisis-induced structural variation in policy effectiveness (Wooldridge, 2013).

If the p-value from the Chow test result came out below the 0.05 threshold, then the data need to be further diagnosed using Hausman test. Operationally, the Hausman test compares the coefficient estimates from the fixed effects and random effects models. A significant test statistic suggests that the differences between the estimators are systematic, which supports the rejection of the null hypothesis (H_0). Consequently, fixed effects estimation is preferred, as it controls for time-invariant heterogeneity that may otherwise bias the results. Conversely, a non-significant result supports the use of the random effects

model due to the efficiency gains under the assumption of exogeneity (Wooldridge, 2013).

Table 2. Model selection tests

Chow test		Hausman test	
H_0 rejects null hypothesis $p < 0.05$	H_0 accepts null hypothesis $p \geq 0.05$	H_0 rejects null hypothesis $p < 0.05$	H_0 accepts null hypothesis $p \geq 0.05$
Fixed effect model	Common effect model	Fixed effect model	Random effect model

Based on the econometric test above, there are 3 panel data regression model that is used to analyze the correlation between the independent variable and dependent variable. The Fixed effect model is well suited to panel data settings where each cross-sectional unit (in this case, each Asian country) may possess time-invariant characteristics—such as legal frameworks, institutional quality, or political stability—that are correlated with the explanatory variables. By allowing each unit to have its own intercept, the fixed effects estimator accounts for these unobserved country-specific factors, thereby eliminating potential omitted variable bias. A major strength of the fixed effects model lies in its capacity to control for all stable

characteristics of a country that do not vary over the study period, even if these characteristics are unobserved or difficult to measure. This is particularly important in the context of the Asian Financial Crisis, where structural differences in policy regimes, regulatory capacity, or macroeconomic resilience may systematically influence both the formulation of economic policy and its outcomes.

In addition to the fixed effects specification, this study also considers the random effects (RE) model as an alternative panel data estimation approach. The random effects model is based on the assumption that the unobserved country-specific effects such as political structure, regulatory quality, or institutional development are randomly distributed across cross-sectional units and are uncorrelated with the included explanatory variables. Unlike the fixed effects model, which absorbs all time-invariant heterogeneity into the intercept, the random effect model treats these effects as part of the composite error term, allowing for the inclusion of time-invariant regressors and gaining efficiency in estimation. (Wooldridge, 2013).

Lastly, common effect regression model or also known as Pooled Ordinary least squares (OLS) assumes that all cross-sectional units (i.e., countries) share a common intercept and slope, treating the dataset as a single, undifferentiated population. In this specification, no distinction is made between individual countries or time periods, thus, any unobserved heterogeneity is subsumed under the general error term. The pooled OLS model is based on several strong assumptions such as the absence of unobserved individual or time-specific effects, homoskedastic and serially uncorrelated errors, and exogeneity of all regressors.

To define the significance of the independent variables consisted of monetary and fiscal policy tools toward the dependent variables consisted of macroeconomic variables of 8 Southeast and East Asian countries through panel data regression model, this study follows the conventional use of p-values derived from the regression output. The p-value indicates the probability of observing the sample coefficient (or one more extreme) under the assumption that the null hypothesis is true. In this context, the null hypothesis for each coefficient assumes that the respective independent variable has no effect on the dependent variable (i.e., the true coefficient equals zero). Each regression coefficient follows these hypotheses:

- Null Hypotheses (H0): The independent variable has no significant effect on the dependent variable
- Alternative hypothesis (H1): The independent variable has a significant effect on the dependent variable

The decision rule for hypothesis testing is based on the p-value corresponding to each coefficient. A variable is considered statistically significant if its p-value is less than or equal to a predetermined level of significance (α) based on the p-values parameter below:

Table 3. Significance level interpretation based on p-value

Significance level (α)	Decision rule	Interpretation
$p \leq 0.01$	Reject H_0 (highly significant)	Highly strong evidence of the effect
$p < 0.05$	Reject H_0 (significant)	Moderate evidence of the effect
$0.05 < p \leq 0.10$	Reject H_0 (low significance)	Marginal evidence of the effect

p > 0.10	Accept H_0 (no significance)	No evidence of the effect

This parameter is applied across all panel regression models in the analysis. The reported p-values allowed us to identify which monetary and fiscal policy variables exhibited statistically significant relationships with the dependent variables such as annual GDP growth, annual inflation rate, unemployment rate, and currency exchange rate changes.

RESULTS AND DISCUSSION
A. Panel data analysis results
1) Annual GDP growth

Before proceeding with panel data analysis, the Chow test is performed to find the suitable panel data regression model for analyzing Annual GDP growth with the independent variables.

Table 4. Chow test result for annual GDP growth

Prob > F	0.0004

The Chow test results showed that the probability of F-statistics p-value shows 0.0004, which rejects the H_0 hypothesis value where p < 0.05, thus the fixed effect model is preferable compared to common effect model. Next, we will conduct the Hausman test to verify the suitable model between fixed effect model and random effect model.

Table 5. Hausman test result for annual GDP growth

Prob > chi2	0.0006

From the Hausman test above, we can conclude, that the result of the test accepts the H_1 hypothesis where the p-value from Prob > chi2 = 0.0006, which is lower than 0.05, the fixed effect model is preferable due to random effect model will provide inconsistent result. Thus, we can conclude the analysis with the fixed effect regression model.

Table 6. Fixed effect model regression clustered by country results for annual GDP growth

Variables	Coefficient (β)	p-value
Lending Interest rate	-.7470576	0.006
Annual M2 change	-.0365503	0.639
Deficit	-.2032412	0.124
pit_r	.0113857	0.829
ct_r	.0852495	0.033
Fiscal	.4190413	0.157
Constant	.1281894	0.000

A fixed-effects regression model was calculated to evaluate the impact of macroeconomic variables on annual GDP growth across eight Asian countries over the period of 1995-2005. To account for heteroskedasticity and autocorrelation identified in the diagnostic tests, the model used robust standard errors clustered by country. The overall model was statistically significant with the $F(6, 7) = 71.85$, p < .001, and a within R^2 of 0.451, indicating that approximately 45.1% of the variation in GDP growth was explained by within-country changes in the predictors.

The lending interest rate exhibited a significant negative association with GDP growth ($\beta = -0.747$, SE = 0.189, t = -3.94, p = .006), suggesting that higher borrowing costs are associated with slower economic growth.

Other result such as corporate tax change also showed a positive and significant effect on GDP growth ($\beta = 0.085$, SE = 0.032, t = 2.65, p = .033), though this may reflect tax structure responses during expansionary phases rather than causality.

Other variables, including annual changes in money supply (M2), fiscal balance, current account balance, and personal income tax rates, did not yield

statistically significant coefficients (p > .10), indicating that their short-run annual fluctuations may have weaker or more complex relationships with output growth in the observed panel. These results may reflect the complex and country-specific ways in which taxation and monetary expansion affect output across the ASEAN region. These findings underscore the significance of monetary and fiscal discipline in promoting sustainable growth across ASEAN economies during the post-crisis period.

2) Annual inflation rate

In order to select the appropriate panel data regression model for analyzing the correlation between the dependent variable of annual inflation rate and the independent variables, it is important to perform the Chow test first.

Table 7. Chow test result for annual inflation rate

Prob > F	0.7244

From the analysis of the chow test above, it is decided that the common effect model regression is preferable to the fixed effect regression model due to the H_0 accepts null hypothesis where the p-value is above the 0.05 threshold, thus we can analyze the correlation of the annual inflation rate as dependent variable with the independent variables using common effect regression model with the help of OLS pooling method.

Table 8. Common effect model regression clustered by country results for annual inflation

Variables	Coefficient (β)	p-value
Lending Interest rate	.8542059	0.001
Annual M2 change	.3738777	0.200
Deficit	.0843841	0.521
pit_r	-.1067483	0.338
ct_r	-.1343965	0.196
Fiscal	-.3750718	0.262
Constant	-.0865602	0.040

By using common effect model adjusted for clustering by country, only the interest rate become statistically significant (β = 0.854, p = .001) independent variable that affects the annual inflation of 8 Asian countries, the clustered common effect regression analysis indicates that the increase in lending interest rate results in increased inflation, which means the tightening of the monetary policy by increasing the cost of borrowing money increases inflation instead of lowering, this happened due to the lending interest rate reacted to the hyperinflation during the Asian Economic Crisis, thus the result contradicts the popular monetary belief of tightening monetary policy. The analysis suggests that among the variables examined, monetary policy tools especially the interest rate has the most consistent and significant influence on inflation during the period studied. Other variables, such as annual M2 change, current account deficit, changes in personal and corporate tax rates and the fiscal spending, did not exhibit statistically significant effects in clustered model specification.

This unconventional analysis result happened due to the common effect regression model used pooled OLS method clustered by countries, this method eliminates the assumption that the whole dataset behaves as a single, undifferentiated common structure with no distinction made between individual countries or time periods and provides correction for within country autocorrelation in panel data, ensuring a more reliable interference (Angrist & Pischke, 2009).

The clustered pooled OLS model explains a substantial proportion of inflation dynamics across countries and time, with an R-squared of 0.63. This suggests that macroeconomic variables

such as interest rates, monetary expansion, and fiscal indicators are strongly correlated with cross-sectional and temporal variation in inflation across East and Southeast Asian economies between 1995 and 2005.

3) Annual change Currency exchange rate

For the panel data regression analysis of annual change in currency exchange rate, we need to perform the Chow test to determine the suitable regression model to analyze the correlation between the annual percent change of 8 Asian currency exchange rates from 1995 to 2005 and the independent variables. The Chow test will determine whether the common effect regression model or fixed effect regression model is preferable for this dependent variable.

Table 9. Chow test result for annual change currency exchange rate

Prob > F	0.0856

From the Chow test above, it is shown that the F-statistic p-value is more than 0.05, which shows no significant structural break across periods and thus the random effect regression model is used as the preferrable regression model to analyze the correlation between the annual change of currency exchange rates and the independent variables.

Table 10 Common effect model regression - Clustered by country results for annual change currency exchange rate

Variables		Coefficient (β)	p-value
Lending Interest rate		1.237999	0.262
Annual M2 change		1.592835	.2450
Deficit		.7045037	.0950
pit_r		.0911229	.7140
ct_r		-.1035443	.7500
Fiscal		-1.845862	.1320
Constant		-.2740731	.028

To account for within-country correlation over time, the model was

calculated with clustering by country. This adjustment leads to larger standard errors across most regressors, and consequently, none of the explanatory variables remained statistically significant at the 5% level, though the sign and magnitude of coefficients remained largely stable. This attenuation in significance highlights the risk of inflated Type I errors in the unclustered model, underscoring the importance of adjusting for intra-group correlation in macro-panel settings (Hoechle, 2007).

While the pooled OLS clustered by country resulting in no strongly significant variables at conventional levels (p-value < 0.05) for the macroeconomic independent variables, only the current account balance (β = 0.7045, p = .095) variable showed a slightly significant positive association with annual change of currency exchange rate, this suggests that a worsening current account balance may be linked to currency depreciation, aligning with classical balance-of-payments theory (Obstfeld & Rogoff, 1995).

Overall, the regression model accounts for approximately 45.6% of the variation in the current account balance ($R^2 = 0.4555$), indicating a moderate explanatory power. The results suggest that while macroeconomic fundamentals such as interest rates, money supply, and fiscal position may play a role in shaping current account trends, their effects are not independently robust across the sample without further conditioning on country-specific dynamics or nonlinearities. This aligns with prior findings that the current account is influenced by a wide array of structural and cyclical variables, many of which are difficult to capture with purely macro-level indicators (Chinn & Prasad, 2003).

4) Unemployment rate

Lastly, for the regression analysis of dependent variable of annual unemployment rate, Chow test is required to determine whether the fixed effect or common effect model is suitable for regression analysis to see the correlation between the unemployment rate of 8 Asian countries from 1995 to 2005 and the independent variables.

Table 11. Chow test result for annual unemployment rate

Prob > F	0.0000

From the Chow test, it is shown that the F-statistic p-value is shown to be 0.000, below the required p-value of 0.05 which rejects the null hypothesis and thus supports the fixed effect model approach for the regression analysis of annual unemployment rate. Further diagnosis using Hausman test is required to verify the suitable model for regression analysis between fixed effect model and random effect model.

Table 12. Hausman test result for annual unemployment rate

Prob > chi2	0.0000

The choice of fixed-effects estimation was guided by the Hausman test, which indicated significant differences between the fixed and random effects models (Prob > chi2 = .000), thereby rejecting the null hypothesis of no systematic differences in coefficients (Hausman, 1978).

Table 13 - Fixed effect model regression clustered by country results for annual unemployment rate

Variables	Coefficient (β)	p-value
Lending Interest rate	-.0392938	0.582
Annual M2 change	-.0075966	0.711
Deficit	.0749335	0.180
pit_r	.0110106	0.719
ct_r	.018646	0.479
Fiscal	-.1008945	0.276
Constant	.04086	0.000

A fixed-effects regression model was estimated to evaluate the impact of macroeconomic variables on unemployment rate across eight Asian countries over the period of 1995 to 2005. To account for heteroskedasticity and autocorrelation identified in the diagnostic tests, the model used robust standard errors clustered by country. The model did not reach statistical significance at the conventional level, $F(6, 7) = 2.53$, $p = .124$, with a within R^2 of .291, indicating limited explanatory power.

None of the predictor variables were statistically significant in this model. For example, the lending interest rate showed a negative but nonsignificant relationship with unemployment ($\beta = -0.039$, SE = 0.069, $p = .582$), while fiscal balance also had a negative but nonsignificant association ($\beta = -0.101$, SE = 0.085, $p = .276$). These results suggest that, within the time frame and country sample, short-run macroeconomic indicators may not exert immediate or consistent effects on employment dynamics, which could instead be influenced by structural labor market factors, institutional conditions, or delayed policy lags. Although current account does not possess significant relationship with unemployment rate, it showed positive relationship with unemployment, meaning that higher current account balance or higher export surplus does increase unemployment, although due to statistical insignificance, means it only influences unemployment on a long-term time frame and does not exert immediate result in the short-run.

These results suggest that, within the time frame and country sample, short-run macroeconomic indicators may not exert immediate or consistent effects on employment dynamics, which could instead be influenced by structural labor market factors, institutional conditions, or delayed policy lags.

B. Other discovery

From all four of the panel data regression analysis for dependent variables such as Annual GDP growth, annual inflation, annual change currency exchange rate, and annual unemployment rate, only annual change of personal income tax rate and corporate tax rate, and fiscal situation net lending/borrowing that showed the least significance towards all four dependent variables after taking into account country-level clustering. This finding contradicts the conventional theory of fiscal policy stating that taxation and government spending policies, in particularly personal income and corporate tax changes may influence macroeconomic outcomes.

Some of the possible explanation might come from gradual economic activity adjustments, where tax and fiscal policy takes time to completely affects broader economy. In addition, businesses and individual often engage in speculatory or compensatory behavior in response to tax and fiscal policy shifts, dampening their real effects on economic outcomes in the short run. For example, businesses might restructure their finance and consumers will change their consumption habit gradually if they expect the government to raise taxes or reduce government spending.

Within the context of Southeast Asian and East Asian countries during the periods of fiscal stress or crisis recovery, broader macroeconomic instruments such as monetary policy, and external demand may play more swift and dominant roles in shaping macroeconomic trends. The study done by Abdon et al. (2014) suggests that personal income tax and corporate tax are less conducive for growth and proposes to use property tax to improve fiscal revenue. Another study done by Lee and Gordon (2005) suggests that overall marginal tax rate does not significantly associate with economic growth rate. Both of the study aligns with the findings in the current analysis, where other controlling macroeconomic variables such as interest rates, fiscal balances, monetary aggregate, or current account positions display stronger statistical significance towards the economy compared to tax rate changes.

Another oddity found from results of the panel data analysis showed that annual M2 change did not demonstrate any statistically significant relationship (p-value > 0.05) on all four dependent variable such as annual GDP growth, annual inflation rate, annual change in currency exchange rate, and annual unemployment rate after taking into account clustering by country despite the theoretical link between monetary expansion and inflation (Friedman, 1968). This aligns with prior research suggesting that the transmission of monetary aggregates into real economic variables is often weak in the short run (Boivin et al., 2009). In the context of Southeast and East Asian economies, the effect of monetary expansion is mediated by factors such as financial depth, institutional frameworks, and varying monetary policy regimes. Additionally, the use of country-clustered standard errors, while controlling for intra-group correlation, often increases standard error size, thereby diminishing the statistical significance of already weak predictors.

Lastly, another unusual discovery from the panel data analysis showed the fiscal situation net lending/borrowing variable also showed no significant result across all four dependent variables. This result might suggest, that the mitigating effect of government spending might not have significant result on macroeconomic indicators as a whole in the shorter time span, this finding is in accordance with Blanchard

and Perotti (2002) study, where they discovered how fiscal policy multiplier take time to affect the economy. Moreover, its effect might be eclipsed by another economic policy such as interest rate or current account position. Thus, a further observation well beyond

Global Financial Crisis of 2008 and Covid lockdown of 2020 are needed in order to actually see the long-term effects of the annual M2 change and tax rate change to the rest of the macroeconomic indicators.
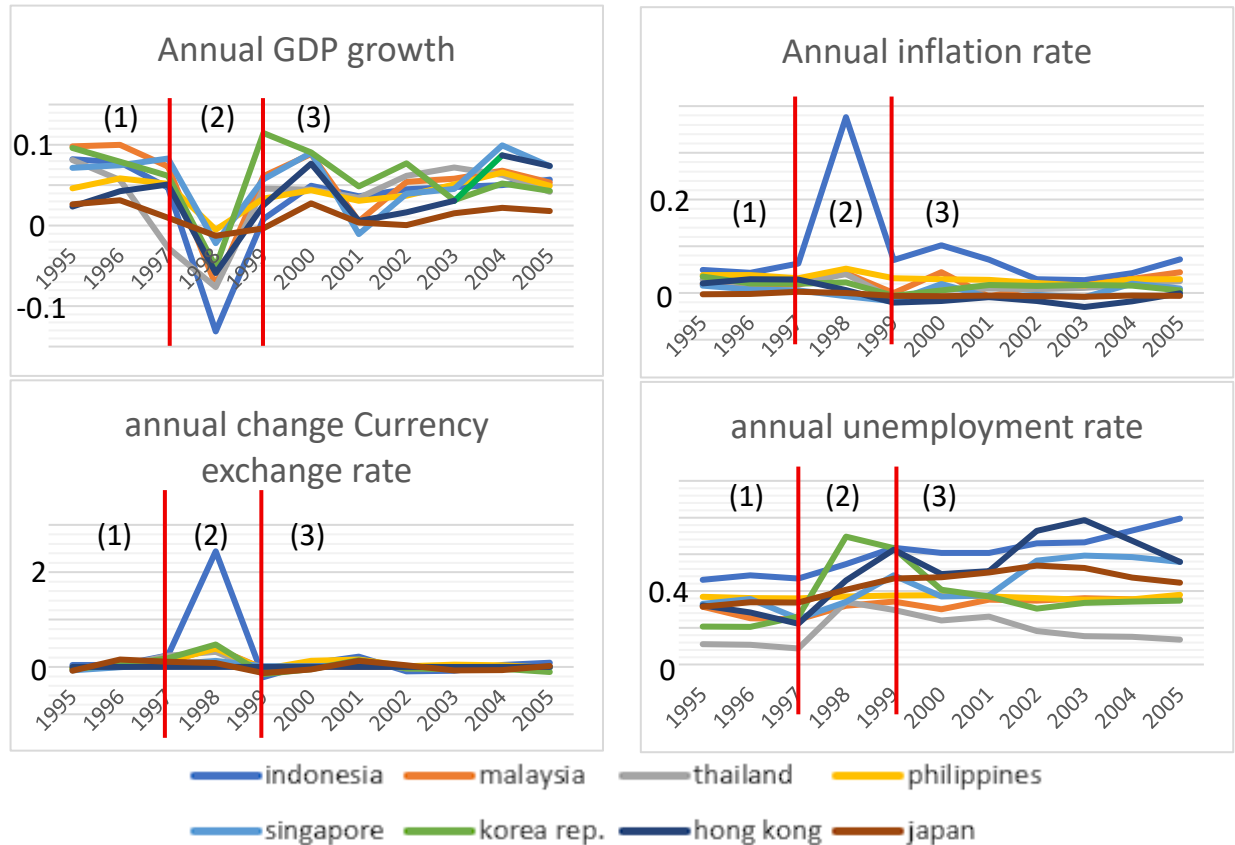
Figure 2. Visual graph of 8 Asian macroeconomic indicators and the graph legend

the Asian Economic Crisis towards

The visual analysis for all four dependent variables of 8 Asian macroeconomic indicators during Asian economic crisis showed that all of the shift in macroeconomic trends in Southeast and East Asia showed temporary economic shocks that started from 1997 and ended in 1999 (section 2), with crisis recovery post-1999 (section 3) returning all macroeconomic indicators to pre-1997 (section 1) levels. This phenomenon coincides with business cycle theory, especially with financial business cycle where the surge of credit booms and asset price bubble

C. Graphical analysis

denominated in foreign currency gradually build up before the crisis in 1997 led to the burst of the financial bubble due to perceived economic vulnerability among the speculators, ending with gradual economic recovery to pre-crisis levels.

All of the dependent variables showed the cyclicality behavior except for annual unemployment rate where it is steadily increasing, which suggest there are other variables affecting it, possibly the population growth of each country. All of these dependent variable's graph followed the independent variable's

movement due to the change in monetary and fiscal policy.

From the graph above, we can witness that Indonesia (normal blue) showed the worst performance during the economic crisis out of all eight Asian from the crisis, despite Thailand (grey) being the epicenter of the Asian Economic Crisis who performed pretty average, leaving only Japan (bright green) to fare pretty well during the height of Asian Economic Crisis.
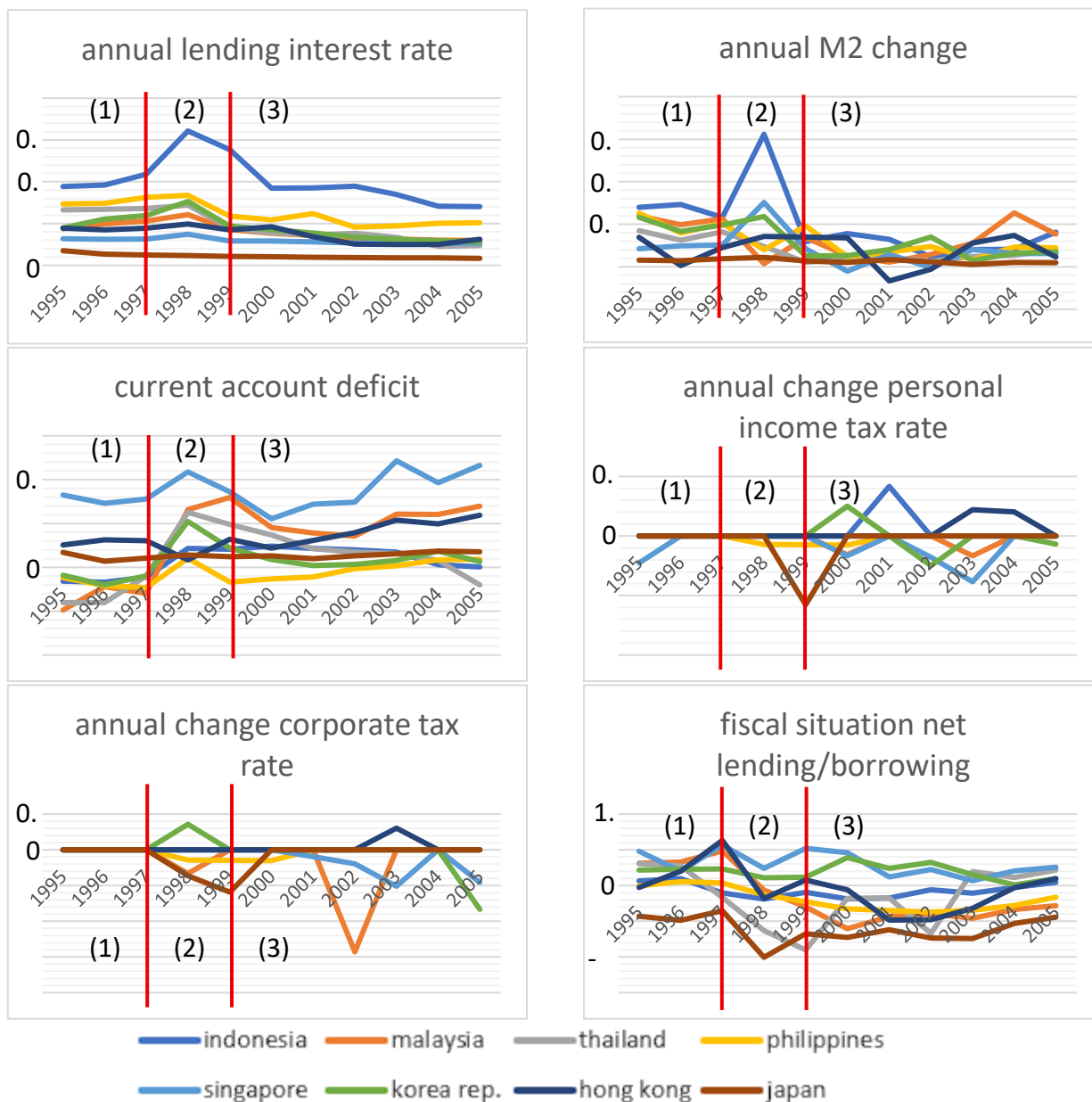
Figure 3.Visual graph of 8 Asian monetary and fiscal indicators and the graph legend countries that were directly affected

The visual analysis of all six independent variables from 8 Asian macroeconomic indicators during Asian economic crisis showed how the tool of monetary policy (annual lending interest rate, annual M2 change, current account deficit) and the tools of fiscal policy (annual change personal income tax and corporate tax, and fiscal situation net lending/borrowing) affects the dependent variables.

Based on the graph above, we can see the point in time when the entire Southeast and East Asian countries start to perform drastic monetary and fiscal policy changes from 1997 to 1999 where some Asian countries such as Indonesia, Malaysia, Philippines and Singapore are taking radical measures to mitigate the economic crisis by sharply increasing interest rate, increasing M2 money supply, improving current account balance, and reduce fiscal spending in which was consistent with the order of the IMF to perform austerity measures (Lane et al, 1999; IMF staff, 1998). Although Thailand (grey) was the epicenter of the economic crisis and followed through the IMF austerity measures, it only focused on improving current account balance and reduction in fiscal spending.

Moreover, the trend in lending interest rates all of the Asian countries only raised sharply during the crisis (section 2) for a very brief period of time. This indicates that crisis was primarily aimed at stabilizing exchange rates and halting capital flight. These monetary tightening periods were short-lived due to their recessionary effects on domestic economy, leading policymakers to swiftly reverse course as macroeconomic conditions stabilized. Thus, the rapid normalization of lending rates in the post-crisis years reflects a broader strategic pivot from emergency stabilization toward economic revitalization (Lane et al., 1999).

Another visible behavior in the graph showed annual changes in personal income tax and corporate tax exhibited completely different behavior compared to the other fiscal policy tool – fiscal situation net lending/borrowing. Visible from the graph, that all of the eight Asian countries performed tax rate reforms well past Asian Economic Crisis post-1999. This delay can be attributed to the nature of the crisis response. During the height of the crisis, governments prioritized financial stabilization, currency defense, and banking sector restructuring, often under the guidance of the International Monetary Fund (IMF), rather than fiscal reform (Radelet & Sachs, 1998). Immediate tax policy changes were avoided to prevent further economic shocks towards investment and domestic demand. It was only after the regional economies began to stabilize post-1999 that governments had both the institutional capacity and political capability to introduce structural fiscal measures, including adjustments to personal and corporate tax rates. Tax rate reforms were often aimed at broadening the tax base, enhancing taxation competitiveness, and encouraging foreign direct investment during recovery period (Woo & Sachs, 2009). In countries like South Korea and Singapore, corporate tax reductions and selective income tax changes were deployed to reinforce pro-growth policies, while Indonesia and Malaysia introduced tax reforms in line with post-crisis IMF restructuring programs. Thus, the delayed tax rate adjustments reflect a strategic shift from crisis containment toward longer-term economic recovery and structural reform.

Lastly, another discovery from the dependent variable and independent variable graphs is the result of the monetary and fiscal policy changes only showed in the period after the policy changes were enacted. Meaning that the effect on macroeconomic indicators from increased interest rate, reduced M2 money supply, increased current account balance, and increased fiscal spending during the crisis period (section 2) does not show in the same year as the crisis period, instead the effect can be seen during post-crisis (section 3) period

where plummeting GDP growth rebound to pre-crisis (section 1) level, skyrocketing inflation subsided to pre-crisis level, and the currency value return to pre-crisis level.

CONCLUSION AND RECOMMENDATIONS
A. Conclusion

This study concludes, that the monetary economic theory argues that money plays a major role in an economy especially in many macroeconomic indicators such as price level, inflation, investment, unemployment, and many more. While the macroeconomic indicators of Southeast and East Asian countries showed a sound and stable performance on paper with no visible large monetary aggregate raise or runaway inflation that could have been the cause for Asian Economic Crisis. Instead, it was the fixed currency exchange rate and the surge in local businesses credit borrowing denominated in foreign currency that triggered the crisis. When the fixed currency exchange rate is threatened by devaluations, the central bank is forced to spend their foreign reserves to keep their national currency stable, while the modern monetary theorist argued that government have national currency sovereignty, thus it can issue fiat currency until the inflation tolerance threshold, but providing local loans in foreign currency does violate the national currency sovereignty, this creates vulnerabilities that allowed speculators to drain the foreign reserves and the state does not issue foreign currency. This resulted in the basket of foreign currency to be drained without reducing the local M2 money aggregate thus this created a massive uneven proportion between available foreign reserve and existing M2 money supply in the circulation, this created a higher demand for foreign currency and in turn, devalue local currency. Interest rate was not the cause of the crisis however it serves as a stabilizing factor for the economy. By raising interest rate, the central bank can induce demand on national currency, reducing inflation by pulling excessive money supply away from circulation, this however worsen inflation in the short-run due to increasing cost of capital which translates to higher cost-push inflation, but it successfully suppressed inflation in the long-run.

From the fiscal standpoint, the periods of fiscal surplus before 1997 indicates lack of investment from government, which on paper showed healthy public finance and created a sense of confidence within investors. Fiscal surplus on the other hand, could be translated to lack of state investments, which indicates much higher proportion of private investments, which in turn created economic vulnerabilities when the investor's trust in the country eroded, leading to investment runs and halting any business activities.

The monetary policies in affected Asian countries behaves as the inflation and currency value control. From monetary viewpoint, inflation was caused by excessive money supply in the circulation and low demand in local currency, which triggers currency devaluation in exchange market and in turn, for countries dependent on imports, it will increase the cost-push inflation. Monetary policy will raise interest rates to reduce the amount of money supply in circulation back to the banks thus this will reduce inflation by cutting excess money supply and stimulate a demand for national currency. This policy is meant to quickly mitigate the Asian Economic Crisis short-term issue of skyrocketing inflation.

Fiscal policies however, behaves as a stimulating role in the post-crisis times, revitalizing consumption and investment at the cost of government budget deficit and lower tax rate, this in turn will improve business environment and reduce unemployment.

There are several lessons can be made from the analysis of Asian Economic Crisis from the monetary and fiscal perspective, first it is important to keep a stable supply of foreign exchange in the modern interconnected economy, it is the one of the important value drivers of national currency and for the import-dependent countries – it is the driving factor for inflation. Second, interest rate has become a consistent tool in controlling economic crisis, although it is not one solution for all problem, it is recommended to only raise interest rate for a brief period of time during the crisis to stabilize exchange rate and prevent capital flight induced by high inflation rate. However, it is not advisable to keep high interest rate for an extended period of time as it could halt any economic activity from higher cost of capital, which in turn raised inflation. Third, the effect of the monetary and fiscal policy mitigation of the economic crisis takes time before the macroeconomic indicators can show concrete result from the mitigation policy. And lastly, all of the monetary and fiscal policy work synchronously as the tools that affect the economy as a whole.

B. Recommendation

To address the issue of Asian economic crisis and the prevention of future economic crisis based monetary and fiscal policy tools, there are several recommendations that can be made in order to prevent similar crisis from happening:

1) Treat both monetary policy and fiscal policy as the macroeconomic tools that worked in unison instead of treating them as individual tools, this allows for maximizing the effectiveness of both monetary policy and fiscal policy tools and complement each policy's weaknesses.

2) Before adopting mitigation policy for an economic crisis, it is advisable to look at the root cause of the crisis first. Enforcing the same economic mitigation policy for different economic crisis and/or a different country facing an economic crisis could cause unending spiral of economic crisis.

3) Only raise interest rates sharply for a short period of time as a form of economic crisis control from investment flight and currency devaluation, for an extended period of time it could lead to cost-push inflation due to higher capital cost.

4) Create a mechanism that allows the government to take swift and independent action to change economic policy to bring a faster economic mitigation without creating a bureaucratic process as shown by Malaysia's capability to halt foreign investment outflows when Asian Economic Crisis happened.

5) Governments in developing countries are ought to create a long-term economic plan beyond 10 years in terms of monetary policy and fiscal policy, this allows for the state to have a clear direction of economic development while also creating a stable and attractive condition for long-term foreign investment instead of short-term money injection into the financial market that enables currency speculation.

6) Increasing state-funded investment will improve the economy supported by fiscal point of view, although this will show a fiscal budget deficit on

paper, which can be seen as negative outlook, but deficit fiscal position could improve domestic consumption, business activity, and employment by driving economic activity from government spending.

7) Provide a transparent and publicly accessible information of macroeconomic indicators that enables public surveillance of economic indicators. This allows for the public to predict the economic crisis before it happens and helped the market to self-correct its own activity to dampen the impact and level of economic recession. This policy framework allows the reduction of the economic vulnerability before a crisis happens and delivers faster economic recovery.

8) Moreover, banks should stop or limit the provision of local businesses with loans denominated in foreign currency and actively promote loans denominated in national currency with attractive interest rates. This will ensure the stability of the demand for national currency and enforce the currency sovereignty, thus protecting the local businesses from the transmission effect of monetary tightening by the foreign currency issuer.

9) Other recommendation calls for amassing large amounts of foreign reserves and adopting managed floating currency exchange policy. This action allows for the country to have a stable supply of foreign reserves to keep import and export activity unhindered by sudden steep devaluation of national currency, moreover with the help of managed floating currency exchange policy, the government can let their national currency value float not only based on market demand but also based on the inflation rate of foreign currency, thus

this allows for less drastic intervention of national currency value and adjust their currency based on desired value.

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