KRED: Korea Research Economic Database for Macroeconomic Research*†‡

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Abstract

We introduce KRED (Korea Research Economic Database), a new FRED-MD-style macroe-conomic dataset for South Korea. KRED is constructed by aggregating 88 key monthly time series from multiple official sources (e.g. Bank of Korea ECOS, Statistics Korea KOSIS) into a unified, publicly available database. The dataset is aligned with the FRED-MD format, enabling standardized transformations and direct comparability; an Appendix maps each Korean series to its FRED-MD counterpart. Using a balanced panel of 80 series from 2009–2024, we extract four principal components via PCA that explain approximately 40% of the total variance. These four factors have intuitive economic interpretations – capturing monetary conditions, labor market activity, real output, and housing demand – analogous to diffusion indexes summarizing broad economic movements. Notably, the factor-based diffusion indexes derived from KRED clearly trace major macroeconomic fluctuations over the sample period such as 2020 COVID-19 recession. Our results demonstrate that KRED's factor structure can effectively condense complex economic information into a few informative indexes, yielding new insights into South Korea's business cycles and co-movements.

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1 Introduction

FRED-MD is a publicly available, monthly macroeconomic database developed by McCracken and Ng (2016) in collaboration with the Federal Reserve Bank of St. Louis. It provides researchers with a standardized, regularly updated panel of 126 U.S. economic time series designed for use in large-scale empirical analyses such as factor models and forecasting. This initiative builds upon a long lineage of macroeconomic datasets, notably those developed by Stock and Watson (1996, 2002, 2005), which formed the empirical backbone of much of the early work in data-rich environments. However, earlier datasets required substantial manual curation and often relied on proprietary sources, making replication and access difficult. FRED-MD addresses these limitations by offering open access to a carefully curated set of series sourced from the FRED (Federal Reserve Economic Data) system, with adjustments made for definitional consistency and historical continuity.

The broader context of FRED-MD's development reflects the increasing popularity and influence of FRED itself. As featured in a 2024 New York Times article titled "Everybody Loves FRED," (Smialek; 2024) the platform has become indispensable to economists, students, journalists, and even policymakers, offering intuitive charting tools and a powerful API that democratizes access to economic data. With nearly 15 million users annually, FRED exemplifies how public infrastructure can enable rigorous, transparent, and reproducible research. FRED-MD builds directly on this foundation, transforming FRED's massive repository into a ready-to-use dataset optimized for modern macroeconomic analysis.

Inspired by the success of FRED-MD in transforming macroeconomic research through standardized, publicly available data, this paper presents a comparable initiative for Korea. We aim to construct a macroeconomic database—referred to as KRED (Korea Research Economic Database)—that aggregates and preprocesses key national indicators for empirical analysis. Unlike the centralized structure of FRED-MD, relevant Korean data are dispersed across multiple platforms. Principal sources include the Bank of Korea's ECOS system, Statistics Korea's KOSIS portal, and data from the Ministry of Employment and Labor. Our effort brings these scattered resources into a unified framework, with a public repository available at https://github.com/crbaek/KRED.

The initial version of KRED includes 88 monthly macroeconomic series dating back to January 1960. For our preliminary empirical analysis, we focus on a balanced subset of 80 variables spanning from September 2009 to December 2024. Factor estimates extracted from this panel suggest the presence of four significant common factors, cumulatively explaining approximately 40% of the total variation. These factors correspond well to interpretable economic groupings: the first is driven by interest rates and exchange rates (Group 6), the second reflects labor market conditions (Group2), the third captures real output and income (Group 1), and the fourth is closely tied to housing activity (Group 4).

The remainder of this paper is organized as follows. Section 2 describes the construction of the KRED dataset, highlighting key differences from the FRED-MD approach. Section 3 presents the results of our empirical factor analysis, including a discussion of diffusion indexes. A full mapping of Korean series to their FRED-MD counterparts is provided in the Appendix.

2 KRED data description

KRED is designed as a FRED-MD-style macroeconomic panel tailored for South Korea. The construction closely follows the data architecture and processing framework of FRED-MD (McCracken and Ng; 2016), which includes standardized monthly time series transformations and economic category classifications. KRED aggregates key national indicators from multiple public sources including the Bank of Korea's ECOS database, Statistics Korea's KOSIS portal, and employment statistics from the Ministry of Employment and Labor (https://laborstat.moel.go.kr/).

KRED contains 88 macroeconomic time series, of which 80 are used in our empirical analysis spanning September 2009 to December 2024. Each series is transformed using analogous codes to those used in FRED-MD, involving log-differences, percentage changes, or standardization, depending on stationarity properties and seasonal behavior. Variables are organized into eight groups: output and income, labor market, consumption, money and credit, interest rates, prices, housing, and international trade.

While the overall structure aligns with FRED-MD, several important differences reflect the unique characteristics of Korean macroeconomic data:

- Labor Market: The FRED-MD Help Wanted Index (HWI) is replaced with the monthly number of newly registered job openings in KRED. Similarly, the HWIURATIO is substituted with the job openings-to-seekers ratio, which reflects the average number of available jobs per job seeker. FRED-MD includes high-frequency indicators like weekly unemployment insurance claims. KRED, by contrast, relies on monthly data. For instance, the U.S. category "Unemployed for 5–14 weeks" is approximated in KRED by "Unemployed less than 3 months". Similarly, other durations of unemployment are tailored to match Korea's statistical definitions.
- Housing Market: FRED-MD provides regional disaggregation of housing starts and permits by U.S. census regions. KRED refines this by categorizing housing data based on Korea's urban structure: Seoul, the Seoul metropolitan area (Incheon and Gyeonggi), five major cities (Busan, Daegu, Daejeon, Gwangju, Ulsan), and other regions. This enhances the regional granularity of housing dynamics.
- Interest Rates and Yields: The U.S. Treasury bill rates (e.g., TB3MS, TB6MS) are not directly available in Korea. These are substituted in KRED by monetary stabilization bond yields (91-day and 1-year maturities). Additionally, whereas FRED-MD emphasizes the 5-year Treasury minus federal funds rate (T5YFFM), our analysis indicates that the 3-year Treasury yield is more informative for Korea's economy, leading us to replace T5YFFM with the 3-year yield spread.
- Exchange Rates: KRED includes exchange rates of the Korean Won against major currencies—U.S. Dollar, Euro, Japanese Yen, and Chinese Yuan. These selections are based on Korea's export shares by trade partner, providing relevant indicators of Korea's external balance and competitiveness.

We also applied transformations to make the series to be stationary. Those codes and series mappings are provided in the Appendix to facilitate replication and comparative analysis. While KRED is aligned in spirit and structure with FRED-MD, it is customized to fit Korea's statistical infrastructure and economic composition. These modifications enhance its empirical usability for business cycle research and real-time macroeconomic monitoring in the Korean context.

3 KRED empirical analysis

To illustrate the usefulness of KRED, we first applied factor analysis. The balanced data set we have chosen is 80 variables from Sep 2009 to Dec 2024, totaling 184 time points. The missed variables are "HOUST", "HOUSETNE", "HOUSEMW", "HOUSETS", "HOUSETW", "RETAILX", "TOTRESNS" and "EXCAUSX". The PCA factor is calculated and the number of factors are selected from the information criteria. In our implementation, the latent factors are estimated using Principal Component Analysis (PCA) by applying singular value decomposition (SVD) to the sample covariance matrix of the data. Let Y be a $q \times T$ matrix, where each row corresponds to a standardized macroeconomic variable observed over T time periods. We compute the sample covariance matrix as YY'/T and perform SVD:

$$\frac{1}{T}YY' = U\Lambda U',$$

where $U \in \mathbb{R}^{q \times q}$ is an orthonormal matrix of eigenvectors, and Λ is a diagonal matrix of eigenvalues in descending order. Let U_r denote the first r columns of U, and Λ_r the corresponding $r \times r$ diagonal matrix of leading eigenvalues. The estimated factor loadings and factors are then given by:

$$\hat{\Lambda} = \sqrt{q} \cdot U_r, \qquad \hat{F}_t = \frac{1}{q} \hat{\Lambda}' Y,$$

where \hat{F}_t is an $r \times T$ matrix of estimated factors, and the scaling ensures that the estimated factors have unit variance across time.

To determine the optimal number of factors, we use the information criteria proposed by Bai and Ng (2002), which balance model fit and complexity. Specifically, we minimize the criterion

$$IC(r) = \log \left(\frac{1}{qT} \sum_{i=1}^{q} \sum_{t=1}^{T} \hat{e}_{it}^{2}(r) \right) + r \cdot g(q, T),$$

where g(N,T) is a penalty function that increases with the number of factors and the residuals are computed as $\hat{e}_{it}(r) = Y_{it} - \hat{\lambda}'_i \hat{F}_t$. The penalty function g(q,T) used in information criteria can take several forms. Common choices include

$$g_1(q,T) = \frac{q+T}{qT} \log \left(\frac{qT}{q+T}\right), \quad g_2(q,T) = \frac{q+T}{qT} \cdot \log \left(q \wedge T\right), \quad g_3(q,T) = \frac{\log(q \wedge T)}{q \wedge T},$$

where $q \wedge T = \min(q, T)$. We also note that an alternative and widely used approach for selecting the number of factors is the graphical scree plot, which visually inspects the eigenvalue decay pattern of the covariance matrix.

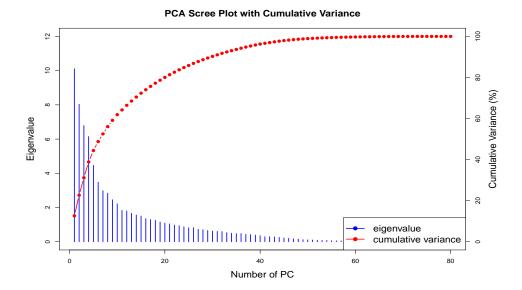


Figure 1: Scree plot.

Figure 1 shows scree plot as vertical bars and and cumulative variance as the cumulative sum of eigenvalues divided by the sum of all eigenvalues. Information criteria finds $\hat{r} = 4, 3, 5$ for g_1, g_2 and g_3 , respectively. Here, we worked with four factors which accounts for 38.49% of total variation. Estimated PCA factors are time plots in Figure 2.

For each factor estimated, we regressed the *i*-th series on a set of k factors for $k=1,\ldots,\hat{r}$. This gives $R_i^2(k)$ for series i and the incremental explanatory power of factor k is calculated as $mR_i^2(k)=R_i^2(k)-R_i^2(k-1), \ k=2,\ldots,\hat{r}$ with $mR_i^2(0)=0$. Thus, the higher incremental explanatory power of factor k means that kth factor is dominated by such variables. Table 1 shows top 10 largest incremental explanatory power of factor $k=1,\ldots,4$ with average importance of factor-k calculated as $mR^2(k)=q^{-1}\sum_{i=1}^q mR_i^2(k)$. Accordingly, Figure 3 shows the incremental explanatory power of factor k sorted by group.

The first factor loads heavily on variables such as T5YFFM, AAA, and AAAFFM, all of which belong to Group 6—interest rates and exchange rates. This factor can be interpreted as capturing monetary conditions and global financial influences, reflecting movements in term spreads, credit risk, and international financial linkages. The second factor is primarily driven by Group 2 variables related to the labor market, including total nonfarm payroll employment, sector-specific employment (e.g., construction, services), the unemployment rate, and the size of the civilian labor force. This factor reflects the overall utilization of labor resources in the economy and tracks shifts in employment conditions and job availability. The third factor is associated with Group 1 variables capturing real economic activity, such as industrial production and output, and can be interpreted as a general business cycle factor. The fourth factor explains variation in housing market indicators, M1 money supply, and other domestic interest rate-sensitive variables, and is best interpreted as a domestic demand factor, reflecting household consumption capacity shaped by liquidity, credit, and real estate conditions. This factor is particularly relevant in economies like Korea, where internal demand and housing cycles are central to macroeconomic fluctuations.



Figure 2: Time plot of four factors.

With all four factors together, Figure 4 shows the $R_i^2(4)$ in decreasing order. Top ten series best explained by the four factors are "T5YFFM", "BAA", "BAAFFM", "AAA", "AAAFFM", "IPMANSICS", "INDPRO", "CUMFNS", "GS5" and "PERMIT". These four factors explain over .5 of the variation in 26 series.

In the FRED-MD framework, factor-based diffusion (FDI, in short) indexes are constructed to summarize broad macroeconomic dynamics using latent common components extracted from large panels of time series data. Unlike traditional diffusion indexes, which measure the cross-sectional share of variables increasing over time, McCracken and Ng (2016) calculates the factor-based approach relies on principal component analysis (PCA) to capture co-movements among variables. For instance, the real activity diffusion index is constructed as the cumulated sum of the estimated factor

$$\widehat{F}_{it} = \sum_{j=1}^{t} \widehat{f}_{ij}.$$

This cumulative representation provides a smoothed and continuous signal of underlying economic conditions. Since the factor reflects broad-based variation across real activity indicators, its cumulative path effectively tracks macroeconomic expansions and contractions over time.

Figure 5 shows four FDI indexes. The factor-based diffusion indexes provide a nuanced view of

Table 1: Total variation explained: .3885

n	$nR^2(1) = .1004$		mI	$R^2(2) = .0848$		
Name	$mR_i^2(1)$	group	Name	$mR_i^2(2) - mR_i^2(1)$	group	
T5YFFM	0.817	6	USGOOD	0.647	2	
AAA	0.812	6	USCONS	0.578	2	
AAAFFM	0.812	6	PAYEMS	0.526	2	
BAA	0.804	6	SRVPRD	0.432	2	
BAAFFM	0.804	6	USGOV	0.365	2	
GS5	0.754	6	UNRATE	0.362	2	
GS1	0.750	6	CLF16OV	0.358	2	
T1YFFM	0.750	6	CE16OV	0.344	2	
TB6MS	0.738	6	AWHMAN	0.311	2	
GS10	0.679	6	CPIAUCSL	0.282	7	
\overline{n}	$nR^2(3) = .0768$		$mR^2(4) = .0558$			
Name	$mR_i^2(3) - mR_i^2(2)$	group	Name	$mR_i^2(4) - mR_i^2(3)$	group	
CUMFNS	0.784	1	PERMIT	0.692	3	
IPMANSICS	0.763	1	PERMITMW	0.691	3	
INDPRO	0.758	1	PERMITS	0.636	3	
IPCONGD	0.515	1	PERMITW	0.629	3	
IPMAT	0.469	1	PERMITNE	0.628	3	
IPDCONGD	0.420	1	CES3000000008	0.382	2	
BUSINVx	0.304	4	CES2000000008	0.289	2	
IPBUSEQ	0.284	1	CES0600000008	0.277	2	
IPFUELS	0.267	1	INVEST	0.206	5	
IPNCONGD	0.259	1	M1SL	0.200	5	

Table 2: Economic Downturns in South Korea and Corresponding Diffusion Index Behavior (2009–2024)

Period	Event / Recession Driver	Affected Factors	Diffusion Index Response
2012-2013	Eurozone crisis, global trade slowdown	F_2, F_3	Mild softening in employment and production activity.
2015-2016	Export/industrial downturn, China slowdown	F_1, F_2, F_3	Clear turning point in real activity and labor; mild dip in monetary conditions.
2020	COVID-19 pandemic shock	F_1, F_2, F_3, F_4	Sharp, synchronized collapse across all indexes; strong rebound in F4 (domestic demand).
2022-2023	Inflation and monetary tightening	F_1, F_3, F_4	Sharp rise in F_1 ; F_3 and F_4 flatten or decline; labor remains stable.

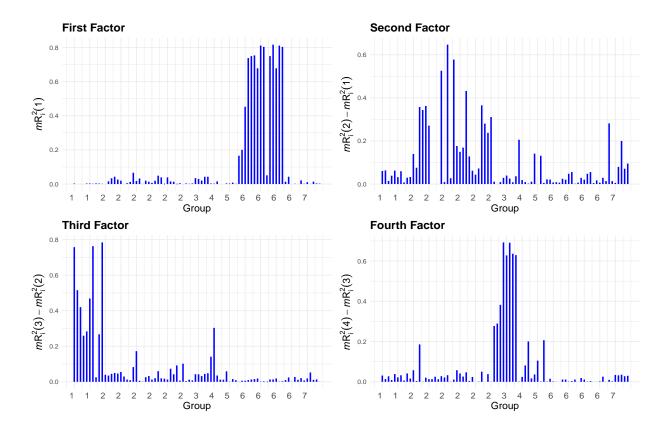


Figure 3: Explanatory power of the factors in \mathbb{R}^2 .

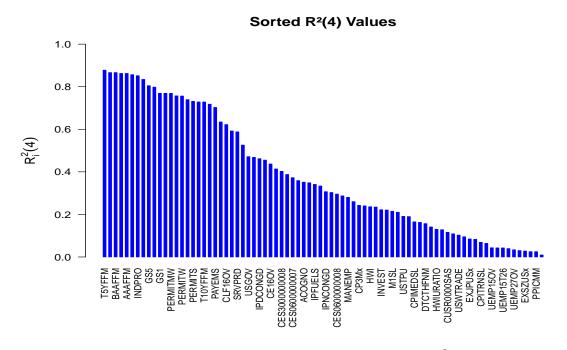


Figure 4: Explanatory power of the factors in $R^2(4)$.



Figure 5: Diffusion indices.

South Korea's macroeconomic fluctuations over the 2009–2024 period, effectively capturing both global shocks and domestic cycles. Major downturns such as the 2020 COVID-19 recession are clearly visible across multiple indexes, with F_1 (monetary conditions) and F_3 (real activity) showing the most pronounced responses. The 2015–2016 slowdown, often underemphasized in headline data, emerges distinctly in F_3 and F_2 , indicating weakening industrial output and soft labor market conditions. These patterns confirm that the diffusion indexes successfully reflect underlying cyclical dynamics.

Moreover, the post-COVID period reveals differentiated sectoral responses. The sharp rise in F_1 during 2022–2023 aligns with global monetary tightening, while F_4 (domestic demand) begins to lose momentum, possibly due to housing market correction and reduced liquidity. In contrast, F_2 (labor market) remains relatively stable, highlighting employment resilience despite macro tightening. Overall, these indexes not only validate historical recession narratives but also offer real-time insight into evolving structural shifts in the Korean economy. More detailed economic downturns are summarized in Table 2.

4 Conclusion

This study constructs KRED as a FRED-MD-style macro dataset tailored to South Korea's economy. By consolidating dispersed data from various national agencies into a single framework, KRED offers a comprehensive collection of macroeconomic indicators in a consistent format. The initial release covers 88 monthly series (dating back to 1960), with a balanced subset of 80 variables from 2009–2024 used in our empirical analysis. By applying principal component analysis, we identified four prominent factors that capture core dimensions of the Korean economy (monetary/financial conditions, labor market, real output, and housing activity) and collectively account for a sizable portion of the macroeconomic variance. These latent factors proved to be highly informative: their corresponding diffusion indexes succinctly track historical business cycle episodes – for example, clearly signaling sharp 2020 COVID-19 downturn – and even shed light on more nuanced dynamics such as the post-2020 divergence between monetary tightening and a resilient labor market. Such findings validate the interpretability and relevance of the extracted factors in representing South Korea's macroeconomic fluctuations. In summary, KRED provides a valuable new tool for macroeconomic research and surveillance in the Korean context. Its alignment with the well-known FRED-MD format and public availability (via the project's online repository) ensure that researchers and policymakers can readily access and utilize a broad range of economic data in a standardized, reproducible manner. We expect that KRED will facilitate improved forecasting and empirical analysis – from factor-augmented models to real-time monitoring – and enable comparative studies by bridging Korean data with international datasets. By establishing this open, FRED-like database for Korea, our work lays a foundation for more rigorous and timely macroeconomic insights, ultimately supporting informed decision-making and future research.

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Appendix

Table 3: Group 1: Ouput and Income

id	tcode	Name	FRED description	KRED description
1	1	INDPRO	IP Index	KOSIS; Production index : All Groups (2020=100, seasonally adjusted)
2	1	IPCONGD	IP:Consumer Goods	ECOS; 8.3.2. Production Index of Manufactruing by Product Group : Con-
				sumers' Goods (2020=100, seasonally adjusted)
3	1	IPDCONGD	IP:Durable Consumer Goods	${\it ECOS; 8.3.2.}$ Production Index of Manufactruing by Product Group : Durable
				Consumers' Goods (2020=100, seasonally adjusted)
4	1	IPNCONGD	IP:Nondurable Consumer Goods	ECOS; 8.3.2 Production Index of Manufactruing by Product Group : Durable
				Consumers' Goods (2020=100, seasonally adjusted)
5	1	IPBUSEQ	IP: Business Equipment	ECOS; 8.3.3 Machinery production index (2020=100, seasonally adjusted)
6	1	IPMAT	IP: Materials	ECOS; $8.3.2$ Production Index of Manufactruing by Product Group : Interme-
				diate Goods (2020=100, seasonally adjusted)
7	1	IPMANSICS	IP: Manufacturing (SIC)	KOSIS; Production index: Manufacturing (2020=100, seasonally adjusted)
8	1	${\rm IPB51222S}$	IP: Residential Utilities	KOSIS; Production index: Electricity, Gas and Steam supply (2020=100, sea-
				sonally adjusted)
9	1	IPFUELS	IP: Fuels	ECOS; 8.3.2 Production Index of Manufactruing by Product Group : Fuel and
				Electricity (2020=100, seasonally adjusted)
10	1	CUMFNS	CapacityUtilization: Manufacturing	KOSIS; Index of manufacturing capacity utilization rate (2020=100, seasonally
				adjusted)

Table 4: Group 2: Labor Market

id	tcode	Name	FRED description	KRED description
11	5	HWI	Help Wanted Index	Work-Net and EIS; Replaced by the number of newly registered job openings.
12	2	HWIURATIO	Ratio of Help Wanted / No. Unemployed	Work-Net and EIS; Replaced by the job openings-to-seekers ratio
13	5	CLF16OV	Civilian Labor Force	KOSIS; Summary of economically active pop. by gender - Labor Force Participation rate $(\%)$
14	5	CE16OV	Civilian Employment	KOSIS; Summary of economically active pop. by gender - Employed persons Total(Unit : Thousand Person)
15	2	UNRATE	Civilian Unemployment Rate	KOSIS;Summary of economically active pop. by gender - Unemployment Rate(%)
16	5	UEMP5TO14	Civilians Unemployed for 5-14 weeks	KOSIS; Unemployed persons by duration of seeking for work - Less than 3 months (Unit: Thousand Person)
17	5	UEMP15OV	Civilians Unemployed? 15 weeks & over	KOSIS; Unemployed persons by duration of seeking for work - 3 months and over (Unit: Thousand Person)
18	5	UEMP15T26	Civilians Unemployed for 15-26 weeks	KOSIS; Unemployed persons by duration of seeking for work - 3 to 6 months (Unit : Thousand Person)
19	5	UEMP27OV	Civilians Unemployed -27 weeds $\&$ over	KOSIS; Unemployed persons by duration of seeking for work - 6 months and over (Unit: Thousand Person)
20	5	PAYEMS	All Employees: Total nonfarm	KOSIS; Summary of economically active pop. by gender - Employed persons Non-farm household(Unit: Thousand Person)
21	5	ICSA	Initial Claims	Korea Employment Information Service Employment Administration Statistics; Labor Market Status; Unemployment Benefit Payment Status (Monthly)
22	5	USGOOD	All Employees: Goods-Producing Industries	Employment and Labor Statistics Portal; All Employees: Goods-Producing Industries (BCF)
23	5	CES1021000001	All Employees: Mining and Logging: Mining	Employment and Labor Statistics Portal; All Employees: Construction (B)
24	5	USCONS	All Employees: Construction	Employment and Labor Statistics Portal; All Employees: Construction (F)
25	5	MANEMP	All Employees: Manufacturing	Employment and Labor Statistics Portal; All Employees: Manufacturing (C)
26	5	DMANEMP	All Employees: Durable goods	Employment and Labor Statistics Portal; All Employees: Durable goods (C16, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33)
27	5	NDMANEMP	All Employees: Nondurable goods	Employment and Labor Statistics Portal; All Employees: Nondurable goods (C10, C11, C12, C13, C14, C15, C17, C18, C19, C20, C21, C22)
28	5	SRVPRD	All Employees: Service-Providing Industries	Employment and Labor Statistics Portal; All Employees: Service-Providing Industries (G~S)
29	5	USTPU	All Employees: Trade, Transportation & Utilities	Employment and Labor Statistics Portal; All Employees: Trade, Transportation & Utilities (GHDE)
30	5	USWTRADE	All Employees: Wholesale Trade	Employment and Labor Statistics Portal; Number of Employed Persons in Wholesale and Merchandise Brokerage (G)
31	5	USTRADE	All Employees: Retail Trade	Employment and Labor Statistics Portal; Number of Employed Persons in retail trade (excluding motor vehicles) (G)
32	5	USFIRE	All Employees: Financial Activities	Employment and Labor Statistics Portal; All Employees: Financial Activities (KL)
33	5	USGOV	All Employees: Government	Employment and Labor Statistics Portal; All Employees: Government (OPQ)

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id	tcode	Name	FRED description	KRED description
34	2	CES0600000007	Avg Weekly Hours : Goods-Producing	Employment and Labor Statistics Portal; All Employees: Wages and Working Hours
				by Industry and Scale; Total hours worked; Goods-Producing (BCF)
35	2	AWOTMAN	Avg Weekly Overtime Hours : Manufacturing	Employment and Labor Statistics Portal; All Employees: Wages and Working Hours
				by Industry and Scale; Overtime hours Worked of permanent employees: Manufacturing (C)
36	2	AWHMAN	Avg Weekly Hours: Manufacturing	Employment and Labor Statistics Portal; All Employees: Wages and Working Hours
				by Industry and Scale; Total hours Worked: Manufacturing (C)
37	6	CES0600000008	Avg Hourly Earnings : Goods-Producing	Employment and Labor Statistics Portal; All Employees: Wages and Working Hours
				by Industry and Scale; Regular wages of permanent employees : Goods-Producing
				(BCF)
38	6	CES2000000008	Avg Hourly Earnings: Construction	Employment and Labor Statistics Portal; All Employees: Wages and Working Hours
				by Industry and Scale; Regular wages of permanent employees : Construction(F)
39	6	CES3000000008	Avg Hourly Earnings: Manufacturing	Employment and Labor Statistics Portal; All Employees: Wages and Working Hours
				by Industry and Scale; Regular wages of permanent employees : Manufacturing(C)

Table 5: Group 3: Housing

id	tcode	Name	FRED description	KRED description
40	4	HOUST*	Housing Starts: Total New	KOSIS; Housing Construction Statistical; Commencement of Housing Con-
			Privately Owned	struction by Housing Type (Households Monthly Total)
41	4	$HOUSTNE^*$	Housing Starts, Northeast	KOSIS; Seoul
42	4	$HOUSTMW^*$	Housing Starts, Midwest	KOSIS; Incheon/Kyunggi
43	4	$HOUSTS^*$	Housting Starts, South	KOSIS; 5 local major cities (Busan/Daegu/Ulsan/Gwangju/Daejeon)
44	4	$HOUSTW^*$	Housing Starts, West	KOSIS; Others
45	4	PERMIT	New Private Housing Per-	KOSIS; Housing Construction Statistical; Statistics of Housing Construction
			mits(SAAR)	Permits by Category (Monthly total)
46	4	PERMITNE	SAAR-Northeast	KOSIS; Seoul
47	4	PERMITMW	SAAR-Midwest	KOSIS; Incheon/Kyunggi
48	4	PERMITS	SAAR-South	KOSIS; 5 local major cities (Busan/Daegu/Ulsan/Gwangju/Daejeon)
49	5	PERMITW	SAAR-West	KOSIS; Others

Table 6: Group 4: Consumption, orders and inventories

id	tcode	Name	FRED description	KRED description
50	4	RETAILx*	Retail and Food Services Sales	KOSIS Retail and Food Services Sales (2020=100.0)(Constant Index)
51	2	ACOGNO	New Orders for Consumer Goods	ECOS; 8.5.8. Value of Consumer Goods Imports(Unit : Thou.US\$)
52	5	BUSINVx	Total Business Inventories	ECOS; 8.3.5. Index of Inventory Turnover Ratio - Manufacturing(Unit : 2020 = 100)
53	2	UMCSENTx	Consumer Sentiment Index	ECOS; 6.2.1. Consumer Tendency Survey - Composite Consumer Sentiment Index(BOK, National)(Monthly)

Table 7: Group 5: Money and credit

id	tcode	Name	FRED description	KRED description
54	6	M1SL	M1 Money Stock	ECOS; 1.1.2.1.2. M1 By Type (Average, Unit : Bil.Won)
55	6	M2SL	M2 Money Stock	ECOS; 1.1.3.1.2. M2 By Type (Average, Unit : Bil.Won)
56	5	M2REAL	Real M2 Money Stock	ECOS; M2SL is diveded by ECOS; CPI (Unit: 2020=100)
57	6	BOGMBASE	Monetary Base	ECOS; 1.1.1.1.4. Components of Monetary Base(End of, Unit : Bil.Won)
58	6	$TOTRESNS^*$	Total Reserves of Depository	ECOS; 1.4.3.1. Reserves of Commercial and Specialized Banks(New version,
			Institutions	average of, Unit : Mil.Won)
59	6	DTCTHFNM	Total Consumer Loans and	ECOS; 1.2.4.2.1. Deposits, Loans & Discounts By Section(Unit : Bil.Won)
			Leases Outstanding	
60	6	INVEST	Securities in Bank Credit at	ECOS; 1.1.6.1. Depository Corporations Survey(End of)
			All Commercial Banks	

Table 8: Group 6: Interest rate and Exchange rates

id	tcode	Name	FRED description	KRED description
61	2	FEDFUNDS	Effective Federal Funds Rate	ECOS; 1.3.2.2. Market Interest Rates(Monthly, Quarterly, Annually); Uncollateralized Call
				Rates(Overnight) (Percent Per Annum)
62	2	CP3Mx	3-Month AA Financial Commeri-	ECOS 1.3.2.2; Yields on CP(91-day) (Percent Per Annum)
			cal Paper Rate	
63	2	TB3MS	3-Month Treasury Bill Secondary	ECOS 1.3.2.2. Market Interest Rates(Monthly, Quarterly, Annually); Monetary stabilization
			Market Rate, Discount Basis	bonds(91-day)
64	2	TB6MS	6-Month Treasury Bill:	ECOS 1.3.2.2. Market Interest Rates(Monthly, Quarterly, Annually); Yields of Monetary
				Stab. Bonds(1-year)
65	2	GS1	1-Year Treasury Rate	ECOS 1.3.2.2; Yields of Treasury Bonds(1-year) (Percent Per Annum)
66	2	GS5	5-Year Treasury Rate	ECOS 1.3.2.2; Yields of Treasury Bonds(5-year) (Percent Per Annum)
67	2	GS10	10-Year Treasury Rate	ECOS 1.3.2.2; Yields of Treasury Bonds(10-year) (Percent Per Annum)
68	2	AAA	Moody's Seasoned Aaa Corporate	ECOS 1.3.2.2; Yields of Corporate Bonds : O.T.C (3-year, AA-) (Percent Per Annum)
			Bond Yield	
69	2	BAA	Moody's Seasoned Baa Corporate	ECOS 1.3.2.2; Yields of Corporate Bonds : O.T.C (3-year, BBB-) (Percent Per Annum)
			Bond Yield	
70	1	COMPAPFFx	3-Month Commercial Paper Minus	ECOS 1.3.2.2; Yields on CP(91-day) - Uncollateralized Call Rates(Overnight)
			FEDFUNDS	
71	2	T1YFFM	1-Year Treasury C Minus FED-	ECOS 1.3.2.2; Yields of Treasury Bonds(1-year) - Uncollateralized Call Rates(Overnight)
			FUNDS	
72	2	T5YFFM	5-Year Treasury C Minus FED-	ECOS 1.3.2.2; Yields of Treasury Bonds(3-year) - Uncollateralized Call Rates(Overnight)
			FUNDS	
73	2	T10YFFM	10-Year Treasury C Minus FED-	ECOS 1.3.2.2; Yields of Treasury Bonds(10-year) - Uncollateralized Call Rates(Overnight)
	_		FUNDS	
74	2	AAAFFM	Moody's Aaa Corporate Bond Mi-	ECOS 1.3.2.2; Yields of Corporate Bonds: O.T.C (3-year, AA-) - Uncollateralized Call
	_	5.4.555	nus FEDFUNDS	Rates(Overnight)
75	2	BAAFFM	Moody's Baa Corporate Bond Mi-	ECOS 1.3.2.2; Yields of Corporate Bonds : O.T.C (3-year, BBB-) - Uncollateralized Call
70	_	DVOZIJO	nus FEDFUNDS	Rates(Overnight)
76	5	EXSZUSx	Switzerland / U.S. Foreign Ex-	ECOS 3.1.2.1; Arbitraged Rates of Major Currencies Against Won, Longer Frequency; Won
	_	DVIDIG	change Rate	per United States Dollar(Basic Exchange Rate) (Closing Rate, unit: won)
77	5	EXJPUSx	Japan / U.S. Foreign Exchange	ECOS 3.1.2.1; Won per Japanese Yen(100Yen) (Closing Rate, unit : won)
70	-	EVIICIII	Rate	ECOC 2121 War and Francisco (Clarina Bata and American)
78	5	EXUSUKx	U.S. / U.K. Foreign Exchange Rate	ECOS 3.1.2.1; Won per Euro (Closing Rate, unit: won)
79	5	EXCAUSx*	Canada / U.S. Foreign Exchange	ECOS 3.1.2.1; Won per Yuan (Closing Rate, unit : won)
			Rate	

Table 9: Group 7: Prices

id	tcode	Name	FRED description	KRED description
80	7	OILPRICEx	Crude Oil, spliced WTI and Cushing	ECOS 9.1.6.3. World Commodity Prices; Crude oil(Dubai Fateh) (unit
				: \$/bbl)
81	7	PPICMM	PPI : Metals and metal products:	ECOS 4.1.1.1. Producer Price Indices (Basic Groups); Non-ferrous metal
				bar & basic products (2020=100, Wgt : 14.1)
82	7	CPIAUCSL	CPI : All Items	ECOS 4.2.2. Consumer Price indices (All Cities, Special Groups); Al-
				litems ($2020=100$, Wgt : 1000)
83	7	CPIAPPSL	CPI : Apparel	ECOS 4.2.1. Consumer Price indices; Clothing and footwear (2020=100,
				Wgt:49.6)
84	7	CPITRNSL	CPI: Transportation	ECOS 4.2.1. Consumer Price indices; Transport (2020=100, Wgt : 110.6)
85	7	CPIMEDSL	CPI : Medical Care	ECOS 4.2.1. Consumer Price indices; Health (2020=100, Wgt : 84)
86	7	CUSR0000SAC	CPI : Commodities	ECOS 4.2.2. Consumer Price indices (All Cities, Special Groups); Com-
				modities (2020=100, Wgt : 447.6)
87	7	CUSR0000SAS	CPI : Services	ECOS 4.2.2. Consumer Price indices (All Cities, Special Groups); Ser-
				vices (2020=100, Wgt : 552.4)
88	7	CPIULFSL	CPI : All Items Less Food	ECOS 4.2.2. Consumer Price indices (All Cities, Special Groups); Ex-
				cluding Food & Energy (2020=100, Wgt : 782.2)

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