TRADEABLE AND NON-TRADEABLE CONSUMER PRICE INDEX SERIES

ANALYSIS PAPER

GENERAL DIRECTORATE OF STATISTICS, MINISTRY OF FINANCE, TIMOR-LESTE

TITLE

TRADEABLE AND NON-TRADABLE CONSUMER PRICE INDEX SERIES, 2017

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NOTES

This is the first tradeable and non-tradeable analytical series

FORTHCOMING ISSUES	ISSUE	REALEASED DATE
	June 2017	July 20th, 2017
Annual Series Review	June 2018	July 19th, 2018

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ABSTRACT

The General Directorate of Statistics produces a Consumers Price Index (CPI) series to allow users to monitor price inflation experienced by households in Timor-Leste. This paper outlines the methodology and application for the addition of two new component series, Tradeable and Non-tradeable CPI. Timor-Leste is a small, open economy, heavily dependent on imports due to limited local production of goods and services. Therefore, there is interest to understand the different sources of price inflation from the tradeable and non-tradable sectors of the economy. This paper investigates tradable and non-tradable products in the context of the CPI in Timor-Leste, and puts forward a set of classifications and new index series to help identify the different sources of price pressures faced by consumers.

INTRODUCTION

Timor-Leste's open economy is influenced by the global economy, both in terms of the availability of goods and services for consumption and the prices faced by consumers. It is important for both policy makers and analysts to understand the various inflation drivers of price change, and the extent to which price change is attributable to domestic factors versus international factors. In an open economy it is generally accepted that while the prices of some products are determined by domestic considerations, prices of other products are largely determined by prices on the world market. Those products whose prices are largely determined on the world market are referred to as Tradable while all other products are Non-tradable.

The compilation of the price indexes that decompose the CPI into tradable and non-tradable items is seen as being of particular use in analysing domestically sourced versus internationally sourced price pressures. This paper seeks to inform decision makers about the new tradeable and non-tradable series, and act as a benchmark for the future development of the analytical series. Thus allowing users to further understand price change in the context of Timor-Leste.

This paper concludes that the negative 12-month CPI rate seen throughout 2016 is driven by internationally sourced price pressures, whilst domestically sourced inflation remained positive and steady.

CONCEPTS AND METHODS

A tradable and non-tradable CPI series aims to measure the contributions of domestic and international inflation to overall household inflation. There is no defined international standard of a tradeable or non-tradeable good or service in the context of the CPI, therefore the main aim of this research is to disaggregate the products depending on their level of exposure to imports and exports. The definition of a tradeable good or service is one that is exposed to a high level of international competition, and its price is influenced by such competition. Similarly, a non-tradeable good or service is exposed to low level of international competition, and its price is considered not to be affected by such competition. In general, it is often the case in Timor-Leste that tangible goods are considered tradeable and services non-tradeable, but this does not always apply.

Inflation for non-tradable items should provide a relatively indicator of the extent to which demand exceeds (or falls short of) supply in the domestic economy. In some cases, for products such as rice, the demand exceeds supply and the price of local rice is influenced by the price of imported rice. Tradable items are much more exposed to international competition, which includes many manufactured goods such as televisions and computers, as well as many food items. The prices of these items should be less influenced by conditions in the Timor-Leste economy, and more affected by prices set on the world markets and fluctuations in the exchange rate.

The key to compiling the analytical series is to classify each of the 99 CPI Elementary Aggregates (EAs) either as tradeable or non-tradeable. The EA level represents the most detailed level of classification in the Timor-Leste CPI. The classification methods use various data sources, such as international trade and domestic household consumption statistics, as well as a good understanding of the Timor-Leste economy.

In some cases, classes are less transparent and will not fall into either category and further research is required. As the economy develops, classifications may be subject to change; therefore, the classifications outlined in this paper will be reviewed accordingly.

IMPORTED GOODS & SERVICES

In order to determine which consumer products face significant international competition, total imports are compared to total household consumption. If imports are greater than or equal to 5 percent of total household consumption, the product is deemed tradable. This process is done using the imports by product data.

If the value (price x quantity) of imports of each product, I_p, is equal to or greater than 5 percent of household consumption, C_p, it is considered that the product is an import competing product.

$$P_p = \frac{I_p}{C_p} \times 100\% > 5\%$$

Where possible, household consumption data from the Living Standards Survey (LSS 2014) is used, however when information is not available, data from the Household Income Expenditure Survey (HIES 2011) is used. Following the classification stage, the CPI is disaggregated to form two new prices indexes consisting of tradeable and non-tradeable consumer goods and services. The analytical series are to be published alongside the CPI series 2 with monthly frequency.

EXPORTED GOODS & SERVICES

Currently Timor-Leste's only major export is coffee (already deemed tradeable); therefore exports are not considered in the benchmark analysis.

CLASSIFICATIONS

The level at which the classification of tradeable and non-tradeable items are made is the Elementary Aggregate (EA) level. It is possible to do this either at the Expenditure Class (EC) level or the Elementary Aggregate level. Figure 1 represents the aggregation structure of the current CPI in Timor-Leste based upon the United Nations COICOP[1] classification structure.

The EC level represents a higher and more general level of aggregation; however, classifying at the EA level provides a more accurate set of classifications due to a more detailed decomposition of the CPI. Currently there are 99 EAs within the Timor-Leste CPI, of which 78 are classified tradeable and the remaining 21 non-tradeable. The classification structure means that the tradeable series holds 64% of the CPI basket weight (in expenditure terms).

The use of a ratio threshold should be seen as a 'rule of thumb' in an attempt to easily and transparently classify each of the CPI EAs. It is also important to assess the appropriateness of each EA's classification from a CPI perspective. For example, the EA Local Rice has an import to household consumption ratio of 0%, since all products within this EA are produced domestically; however since the price level is affected by the price of imported rice (import competing product), it is deemed a tradeable good in the CPI.

[1] **CLASSIFICATION OF INDIVIDUAL CONSUMPTION ACCORDING TO PURPOSE (COICOP) IS A REFERENCE CLASSIFICATION PUBLISHED BY THE UNITED NATIONS FOR HOUSEHOLD CONSUMPTION**
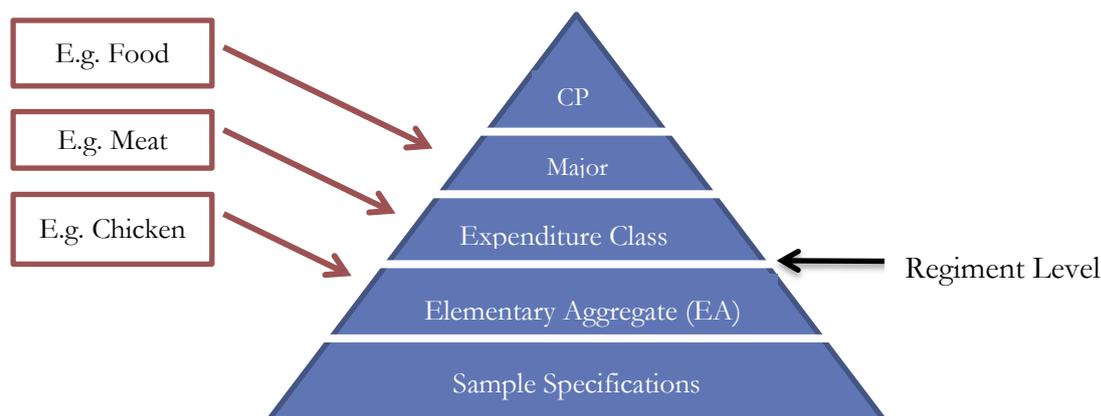
FIGURE 1: AGGREGATION STRUCTURE OF THE CPI TIMOR-LESTE

RESULTS

Using the set of classifications, the new analytical time series are compiled via value aggregation. The classifications will remain fixed until the next review; however they may be subject to a change in weighting structure as a function of price or quantity changes (series 3 re-weight).

For the year ending May 2017, the tradable contribution to total consumer price inflation was 63.6 percent. The tradable sector has slowly declined as a proportion of CPI – from 65 percent at the beginning of the series (Dec-12), to 63.6 percent in April 2017. The fall is attributable to price change in the CPI, with the quantities fixed under the Series 2. Figure 2 represents the 12-month inflation rate and index of the tradeable and non-tradeable series.

In reference to Figure 2, the rate of inflation of the non-tradeable series is higher for the period March 2014 to January 2017, operating at a level of around 1% to 3%. The 12-month rate of non-tradeable CPI is driven by domestic market forces, such as local production (supply) and demand of goods and services. On the other hand, the rate of inflation of the tradeable series is considerably lower over the same period, operating at a rate of -3% to 1%. Based upon the methodology, the tradeable 12-

FIGURE 2: TRADEABLE AND NON-TRADEABLE INDEX SERIES AND 12-MONTH INFLATION RATES
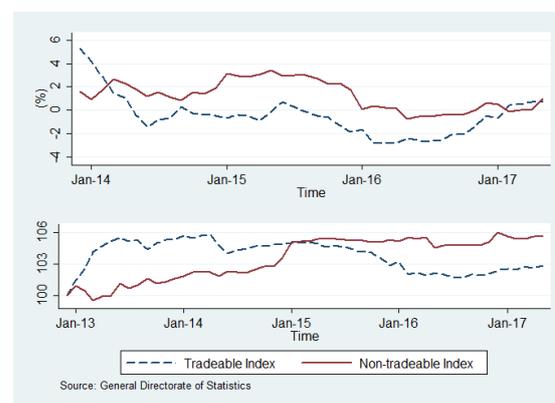
month rate is driven by international price pressures. These include the nominal exchange rate and world commodity prices. The IMF all commodity price index (indicator) fell 35% between Dec-13 and Feb-17, indicating heavy downward pressure on import prices in Timor-Leste. Similarly, the Timor-Leste Nominal Effective Exchange Rate[2] (NEER) appreciated 27% over the same period, putting further downward pressure on the price of imported goods. Following a rise in world commodity prices late into 2016, the

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[2] Nominal Effective Exchange Rate (NEER) is a measure of the value of a currency against the weighted average of several foreign currencies

rate of inflation of the tradeable series appears to be showing an upward trend. On the other hand, the non-tradeable series is showing little direction and is fluctuating around 0%.

This method measures the extent to which consumer products face international pressures in a direct sense. That is, products that face international competition or that compete with imported products. For example, electricity contributes a significant proportion of businesses intermediate consumption and consumer spending. However, the electricity generation and electricity transmission are not included in the tradable sector because the local government heavily subsidises this and therefore determines the price of electricity. The price of products in the tradable sector will sometimes be affected by domestic inputs that are not included in the tradable sector.

NON-TRADEABLE INFLATION

There is relatively little published analysis on the factors that influence non-tradable inflation in Timor-Leste, since the determinants are harder to quantify. This section outlines the main characteristics of non-tradable items in the CPI. It then examines the factors that are relevant to inflation in the prices of non-tradable goods and services.

The exposure of an item to international competition is both complicated to measure and a matter of degree. Currently, non-tradable items make up around 36 per cent of household spending (HIES 2011). The share of spending on non-tradable items depends on local production factors and disposable income of consumers. In general, as incomes increase, spending patterns shift towards services (non-tradable).

It is assumed that imported inputs account for a small share of prices of non-tradeable items in Timor-Leste, meaning that world prices and exchange rate movements have a small direct impact on non-tradeable goods and services. On the other hand, exchange rate movements have a more indirect effect. For example, a sharp depreciation in the US dollar would cause import prices to rise, thus shifting spending to less tradeable items and more non-tradeable items.

Since the series 2 CPI began, the headline 12-month inflation rate has averaged just 0.1%; however the tradeable inflation rate has averaged -0.6%, much lower than the non-tradeable rate at 1.4%. Both supply and demand forces explain the movements in non-tradeable items, as well as some less 'explainable' drivers. In the context of Timor-Leste, the productivity of the non-tradable sector is slow and less reactive than that of the tradeable sector. When demand increases (e.g. increase in wages), this puts upward pressure on the prices of non- tradeable items, whilst the price tradeable items continues to be dominated by international market factors. Another thing to consider is the integration of the global trading system, often making the price of tradeable goods cheaper. Conversely, domestically produced goods in Timor-Leste do not experience this paradigm. The government of Timor-Leste plays its role in determining non-tradable inflation, making up a huge amount of salaries and wages within the economy (domestic demand). In addition, subsidies and domestic taxes also control the price of goods, which otherwise may be considered tradeable (e.g. electricity).

ANALYSIS

In order to better understand the determinants of tradeable and non-tradeable inflation rates, this section provides a brief analysis of both domestic and international price drivers within the context of Timor-Leste.

TRADEABLE FACTORS

International commodity price indexes and exchange rate movements provide a good indication of the direction of international price pressures on the tradeable CPI, Figure
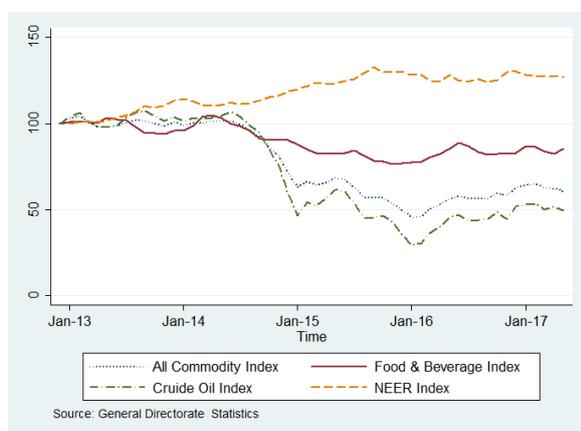

Source: General Directorate Statistics

FIGURE 3: TIME SERIES OF IMF COMMODITY PRICE INDEXES AND NOMINAL EXCHANGE

3 shows the IMF all commodities, food and beverage, crude oil and rice index and the Timor-Leste NEER over the period December 2013 – May 2017 (allowing for lagged effects). With reference to Figure 3, the recent overall decline in world commodity prices is evident, including food and non-food items. The US dollar appreciated over this period, which will have put an overall downward pressure on the price of tradeable goods and services in Timor-Leste.

Figure 4 represents a collection of scatter plots illustrating the linear relationship between the tradeable CPI series and economic price indicators discussed above. Simple linear regression analyses were conducted to determine the statistical relationship between the tradeable CPI index and the economic indicators in consideration. Table 1 summarizes the simple linear regression results as shown in Figure 4.
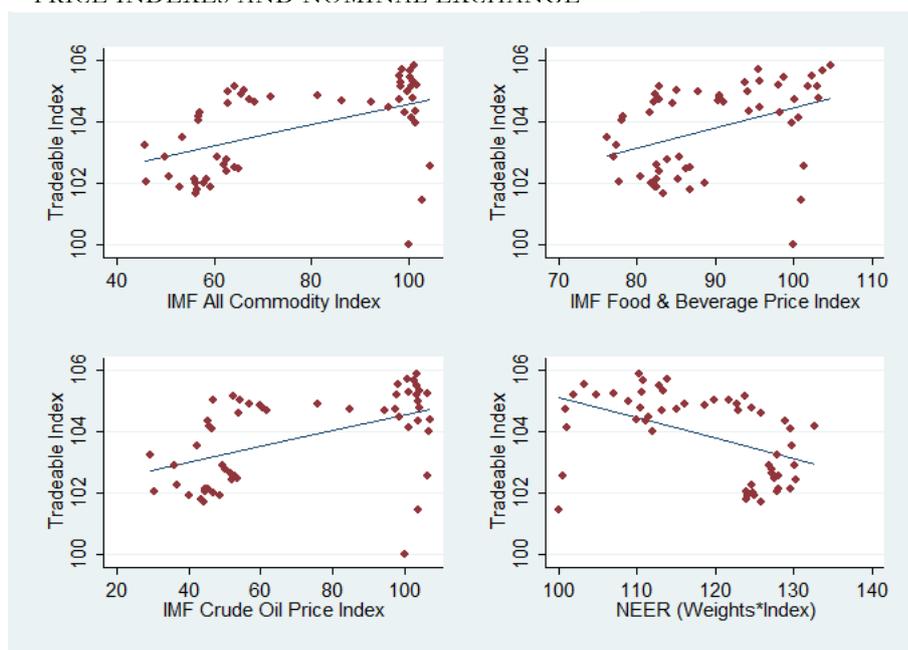

FIGURE 4: SCATTER PLOTS AND LINEAR RELATIONSHIP BETWEEN TRADEABLE SERIES AND INTERNATIONAL PRICE DETERMINANTS

Linear Relationship T=Tradeable CPI	Intercept Term β_0	Gradient Term β_1	Adj R^2	P-value for test $H_0: \beta_1 = 0$
T = β_0 + IMF All Commodities × β_1 + ε	101.16	0.034	23%	0.00
T = β_0 + IMF Food & Beverages × β_1 + ε	97.94	0.065	14%	0.003
T = β_0 + IMF Crude Oil × β_1 + ε	101.99	0.026	23%	0.00
T = β_0 + NEER × β_1 + ε	111.83	-0.067	22%	0.00

TABLE 1: SUMMARY STATISTICS AND RESULTS FROM REGRESSION ANALYSIS

The simple linear predictors reported in Table 1 are all statistically significant at the 1% level (P<0.01), suggesting that international commodity prices and exchange rate movements are a key determinant of the tradeable CPI rate. More complex regression models are not considered in this analysis since the primary aim of this section is to simply understand the determinants of tradeable inflation. The interpretation of the results are as follows; For an increase (decrease) in the IMF all commodity, food and beverages or crude oil index, it is expected that the tradeable CPI will also increase (decrease) at least 99% (P<0.01) of the time. Similarly, for an increase (decrease) in the NEER index (Timor-Leste), it is expected that the tradeable index will decrease (increase) at least 99% (P<0.01) of the time. Following the results of this brief statistically analysis, it can be concluded that the Timor-Leste tradeable index is (as expected) driven by international market forces and movements in the nominal exchange rate of the US dollar with respect to trading partner currencies.
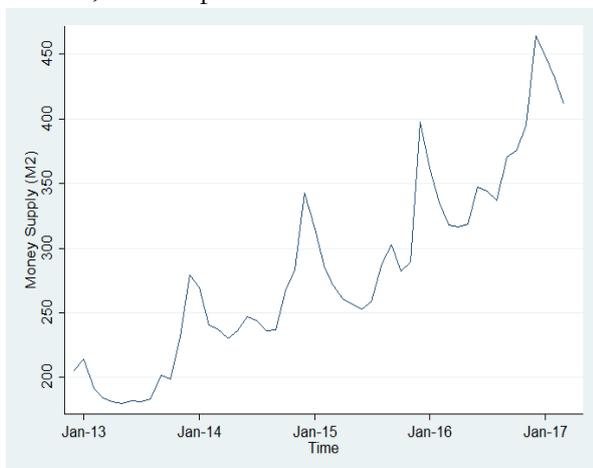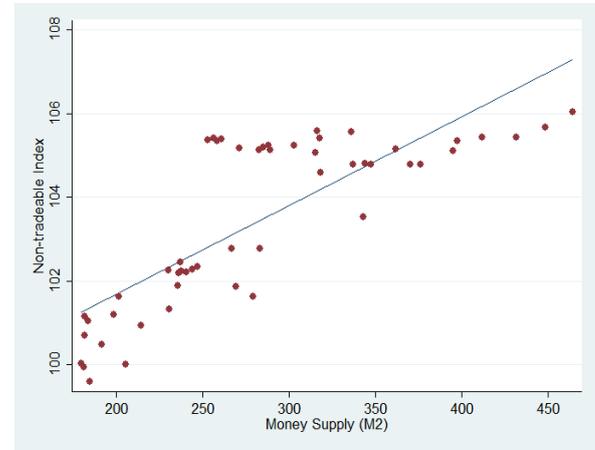
NON-TRADEABLE FACTORS

Domestic prices pressures on the non-tradeable CPI components include local supply and demand forces, government policy, government expenditure and other non-market forces. Higher wages and higher disposable income tend to push up prices of non-tradeable items, because rising wealth shifts demand towards services (generally non-tradeable) away from goods. As an indicator of demand, Figure 5 represents the domestic money supply (M2) in Timor-Leste. In reference to Figure 5, the domestic money supply has been increasing steadily, rising 109% since December 2012. Table 2 represents further economic indicators of domestic demand.

FIGURE 5: DOMESTIC MONEY SUPPLY (M2)

Economic Indicator	2013	2014	2015	Average
GDP Growth of Non-Oil Sector	2.7%	4.3%	4.0%	3.7%
Population Growth	2.7%	2.7%	2.1%	2.5%
Household Final Consumption Expenditure	3.1%	6.2%	4.0%	4.4%
Government Expenditure $	870.5m	951.0m	933.7m	-

TABLE 2: ECONOMIC INDICATORS OF DOMESTIC DEMAND

The data indicate an overall increase in domestic demand over the period due to population growth, increased household expenditure and a steadily growing non-oil sector[3]. As mentioned previously, growth in consumer demand is expected to drive up prices of non-tradeable items due to changes in expenditure patterns. To explore this further, consider Figure 6, which represents a scatter plot of domestic money supply against the non-tradeable index series. There is a clear positive relationship between money supply and the non-tradeable CPI series. Table 3 summarizes the simple linear regression analysis assessing the relationship between domestic money supply and the non-tradeable index series.

The simple linear predictor reported in Table 3 is statistically significant at the 1% level (P<0.01), suggesting that money supply is a key determinant of the non-tradeable CPI rate. The interpretation of the result is as follows; for an increase (decrease) in the domestic money supply, the non-tradeable index is expected to increase (decrease) at least 99% of the time (P<0.01). Following this statistical analysis, there is strong evidence to suggest that the non-tradeable index is driven by domestic demand for goods and services. Furthermore, there appears to be a strong relationship between consumer spending and the non-tradeable index, with consumer expenditure rising steadily in 2013, 2014 and 2015.

FIGURE 6: DOMESTIC MONEY SUPPLY (M2) VS NON-TRADEABLE INDEX

Linear Relationship NT=Non-Tradeable CPI	Intercept Term β_0	Gradient Term β_1	Adj R^2	P-value for test $H_0: \beta_1 = 0$
NT = β₀ + Money Supply × β₁ + ε	97.44	0.021	63%	0.00

TABLE 3: SUMMARY STATISTICS OF SIMPLE LINEAR REGRESSION MODEL

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[3] GDP Growth and Household Final Consumption Expenditure are measured in constant terms

DISCUSSION TOPICS

DOMESTIC TAXES AND SUBSIDIES

In addition to using a five percent threshold as a rule of thumb to determine the classification of classes of products as either tradable or non-tradable, it is also important to consider the contribution of taxes and subsidies to the price of products. Since taxes and subsidies are a domestic contribution, any change in these that result in a change to the price consumers pay will represent domestic, rather than imported inflation. One example is the local government subsidy on electricity, one could argue the price level of electricity in Timor-Leste is tradeable; however due to government subsidies there is a domestic determinant of the price level. Since taxes and subsidies are a domestic impact, it makes economic sense to classify products as non-tradable where these make a large contribution to the consumer price.

PRICE LEVEL VERSUS PRICE CHANGE

As the CPI is a measure of pure price change over time, ideally one would assess the impact of the two sources of inflation, domestic and imported, on the *price change* rather than the *price level*. Unfortunately, it is very difficult to quantify the impact of domestic and international forces on the price change. Therefore, the method used for this analysis is the determinants of the price level of each CPI EA.

SPLITTING BELOW EXPENDITURE CLASS

The classification procedure in this analysis focuses on classifying at the Elementary Aggregate (EA) level, which is the lowest aggregated level of CPI data. This is a very detailed level that allows samples of homogeneous products to be formed. The CPI structure includes a more general, less detailed level of Expenditure Class (EC). In all, there are currently 99 EAs in the CPI, compared to just 35 ECs. Classifying at the EC level would be beneficial for users; however it would compromise accuracy as many ECs contain EAs that are both tradeable and non-tradable.

CONCLUSION

It is accepted that the Timor-Leste economy depends heavily on imports due to a lack of local production and manufacturing, which means that consumer prices are heavily influenced by international market forces. Consequently, a significant number of the classes (EA level) are classified as tradeable. However, there are still a number of domestic goods and services that are classified non-tradeable.

The Food and non-alcoholic beverages group makes up the majority of the CPI basket in both sample size and weight; therefore, the tradeable series holds a more significant weight (64%) than the non-tradeable series as many food products such as rice are classified as tradeable.

The prices of non-tradable items are strongly determined by domestic influences, consistent with their lower exposure to international competition. Non-tradable inflation can also be interpreted as providing information regarding the extent of spare capacity in the domestic economy, and perhaps more so than for the aggregate CPI, which includes the prices of tradable items. It is apparent that there is a wide range of factors affecting non-tradable inflation, including local production and demand and well as non-market factors and government influences.

It is expected that the non-tradeable series will be more stable over time, as it is less prone to direct economic shocks in the exchange rate or world commodity prices. Both supply and demand forces will help explain the relative increase in prices of non-tradeable items, with rising wealth tending to put a shift in demand towards services (generally non-tradeable) rather than goods (generally tradeable). Similarly a rise (fall) in the nominal exchange rate of the US dollar will decrease (increase) demand of some domestically produced tradeable items such as rice.

In terms of the classification structure, it is expected to remain broadly unchanged in the short term; however as local production, government policy and foreign direct investment expands, the classification of some EAs will change accordingly. The re-weight of the CPI expenditure basket may lead to changes in the classification structure (COICOP), which in turn could affect the construction of the two analytical series.

RESOURCES

The analytical series are compiled by the prices division at the General Directorate of Statistics, which will be delivered alongside the routine production of the monthly statistics. As mentioned previously, data from trade are the primary source of information for classification of EAs as either tradeable or non-tradeable; however as more information becomes available, including supply and use tables (SUT) from the national accounts, a more robust classification method can be defined.

APPENDIX

The following table represents a brief summary of the results for the first release of the new component series, May 2017.

TRADEABLE & NON-TRADABLE CPI

The CPI Tradable and Non-tradable series, measure the contribution of domestic (non-tradable) and imported (tradable) inflation to overall household inflation. Identifying the source of household inflation supports the understanding of the different drivers of inflation, as well as informing monetary and fiscal policy decisions.

The definition of a tradeable good or service is one that is exposed to a high level of international competition, and its price is influenced by such competition. Similarly, a non-tradeable good or service is exposed to low level of international competition, and its price is considered not to be affected by such competition. Inflation for non-tradable items should provide a relatively good sense of the extent to which demand exceeds (or falls short) of supply in the domestic economy. Tradable items are much more exposed to international competition, which includes many imported manufactured goods such as televisions and computers, as well as many food items. The prices of these items should be less influenced by conditions in the Timor-Leste economy, and more affected by prices set on world markets and fluctuations in the exchange rate.

Figure A1: Contribution of Tradeable CPI and Non-Tradable CPI to 12-month Inflation rate, Dec-12 to May-17
Source: General Directorate of Statistics, Ministry of Finance
Notes: Individual contributions may not sum to the total due to rounding.
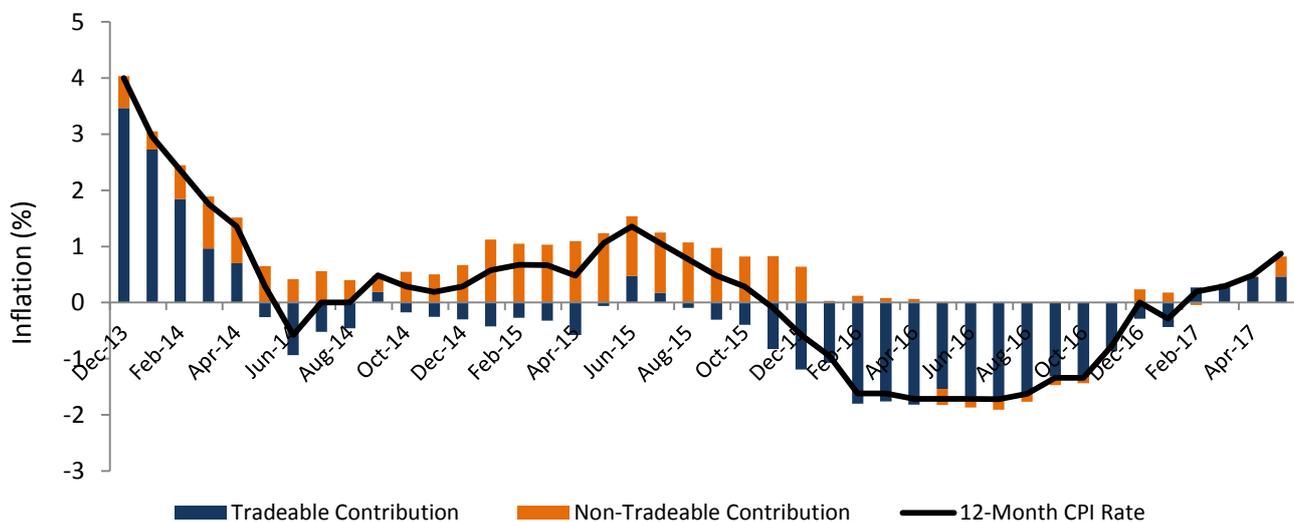
In reference to Figure E, the negative 12-month inflation as seen over the period November 2015 to January 2017 has been driven by international factors as indicated by the tradeable CPI rate. The 12-month CPI rate is currently at 0.9%, which is driven by the Tradeable (+0.7%) and Non-Tradable (+1.0%) contributions.