

Box 1: TES (Bonds Issued by the Colombian Government) NDF Market Characterization¹

Introduction

TES Non-Delivery Forward² (NDF) is a derivative instrument by which the parties agree to buy or sell Colombian public debt securities denominated in local currency (TES) at a future date, at a price agreed on the contract negotiation date. Generally, these contracts are negotiated between a local and a foreign counterparty. Most of the local counterparties in these transactions are banks of the commercial bank group.

In reality, local counterparties usually buy TES on the spot market at the same time they sell TES NDF to foreign investors. This strategy seeks to mitigate the risk associated with variations in the price of the security used in the derivative contract, since, by assuming a buying position in the spot market, they acquire a natural hedge for their selling positions in TES NDF.

Since July 2023, foreign investors have significantly increased their buying position in TES NDF, going from COP 4 trillion (t) to COP 21 t at the end of 1Q25. This dynamic appears to be motivated by expectations of TES valuation and a downward trend in interest rates in Colombia.

Considering the high growth of this market and its interaction with the spot market through local counterparties, this box presents its main characteristics. The analysis is organized into three sections: the first describes the volumes, characteristics, and types of agents involved in TES NDF contracts. In the second, an analysis based on network topology is developed, the aforementioned examines the relationships between the parties involved in these operations. Finally, a study of recent market dynamics is presented.

TES NDF Market Characterization

In a TES NDF contract, the parties agree on a future price of an underlying TES for a specified term. As it is a non-delivery instrument, the settlement of these contracts does not imply the delivery of the underlying asset, but, at the expiration of the contract, the agreed price is compared with the market price³ of the underlying TES and the difference is transferred to the

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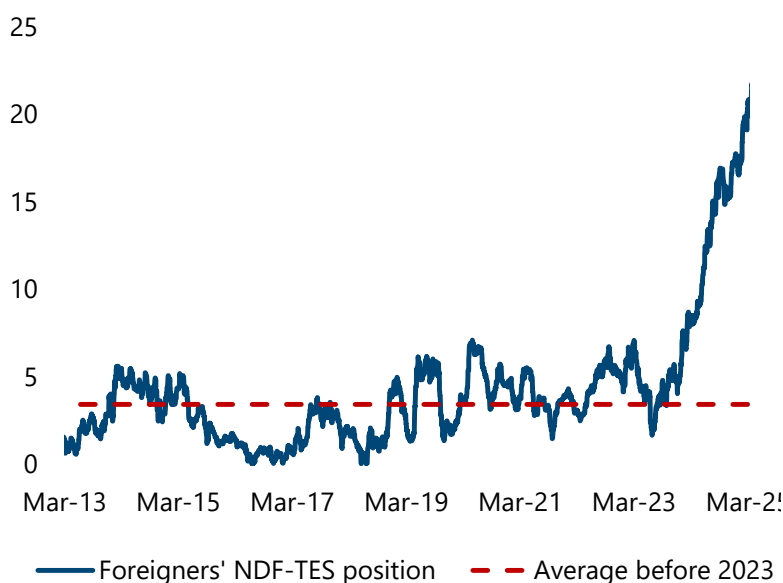
² Being a Non-Delivery instrument, the settlement of these contracts does not imply the delivery of the underlying asset, but, at the expiration of the contract, the agreed price is compared with the market price.

³ Corresponds to the price on the screens of the negotiation systems.

corresponding party (there is no delivery of the TES)⁴. Additionally, these contracts are traded as over-the-counter (OTC) derivative instruments, i.e., negotiations are conducted through bilateral agreements between the parties involved, rather than, for example, through a trading platform.

Based on the information reported by local counterparties to *Banco de la República (BanRep)*⁵, since July 2023, foreign investors have significantly increased their buying position in TES NDF, mainly on underlying securities of the medium and short ends of the curve. On average, their position rose from COP 4 t before 2023 to COP 21 t at the end of 1Q25 (*Graph B1.1*). Commercial banks are the main local counterparties of foreign investors in these transactions, representing 90% of their buying position, followed by financial corporations (6%) and brokerage firms (4%).

Graph B1.1. Buyer Position of Foreign Investors in TES' NDF Contracts (Trillions of Pesos)



Source: *BanRep*.

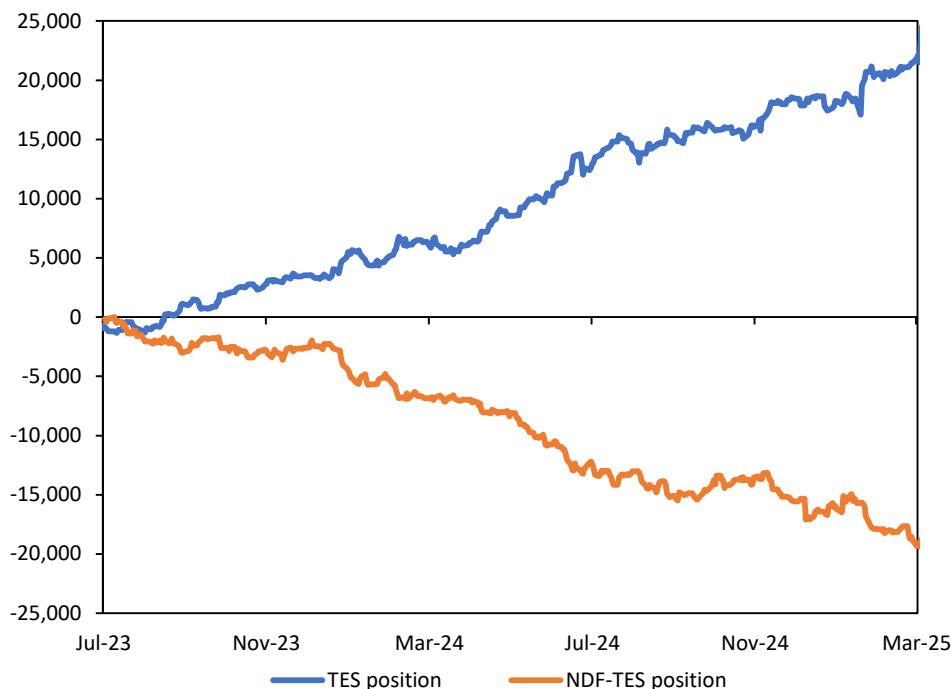
⁴ By way of example, if an agent acquires a TES' NDF on a certain reference at an agreed price of 100, and at the expiration of the contract the market price of that TES reference is 102, this agent receives from its counterparty the difference between both prices (2) multiplied by the amount of the contract.

If the market price of the TES reference at the expiration of the contract had been lower than the price agreed on the negotiation date (for example, 97), the agent would have had to pay the difference between both prices (3), multiplied by the amount of the contract, to its counterparty.

⁵ As provided by the external regulatory circular DOAM-144, entities acting as local counterparties in TES' NDF negotiations with a foreign counterparty must report information on these operations to Banco de la República (the Central Bank of Colombia) on a daily basis.

Local counterparties, which sell TES NDF to foreign investors, in turn adopt hedging strategies by purchasing TES in the spot market⁶ (Graph B1.2). When assuming the selling position in the NDF, these entities seek to mitigate the risk of losses arising from possible variations in the price of the underlying security. Thus, since July 2023 and in line with the significant increase in the purchasing position of foreign investors in TES NDF, local banks have acquired TES of a similar magnitude (COP 20 t) in the spot market.

Graph B1.2. Position in TES and NDF of TES of Local Counterparties * (Trillions of Pesos)



*The positions of local counterparties that have concentrated operations in TES' NDF during the period are shown.

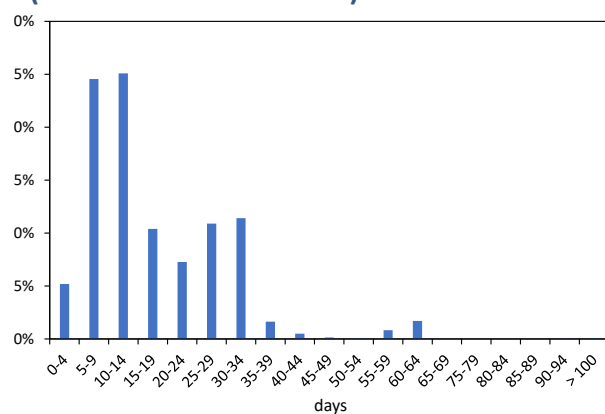
Source: BanRep.

Characteristics of TES' NDF contracts suggest that this market is geared toward short-term investments. Most TES NDF contracts have maturities of 15 days or less (65% of the total amount) and rarely exceed 30 days (Graph B1.3). Additionally, the TES securities underlying these contracts mainly belong to the middle and short ends of the curve (60% of the total amount, on average) (Graph B1.4).

⁶ If a local counterparty sells a TES' NDF at an agreed price of 100 on the trade date, and at the expiration of the contract the market price of the TES benchmark used in the derivative is 103 (i.e. the benchmark was valued), then the local counterparty would incur a loss, as it must pay the foreign counterparty the difference between both prices (3).

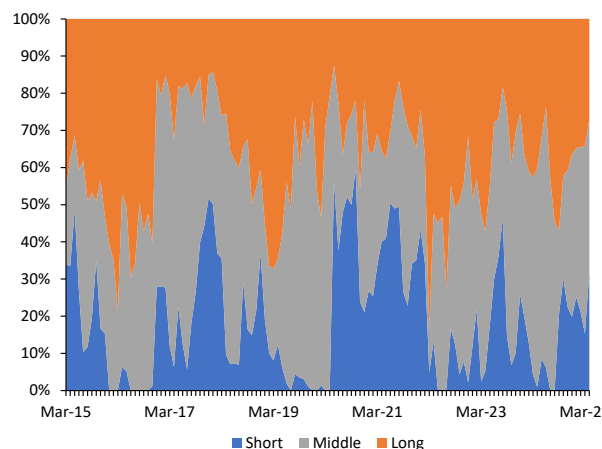
To hedge against potential losses from unfavorable movements in the price of the underlying TES, the local counterparty buys that same TES benchmark in the spot market at the same time as selling the NDF. In this way, by having purchased the security in cash, the investor realizes a gain if its value appreciates. For example, if the spot price went from 100.5 to 103 between the date of purchase and the maturity of the NDF, this gain offsets the loss suffered by the derivative.

Graph B1.3. Participation per Term within the Total Amount of TES NDF Operations (March 2025 - % of total)



Source: BanRep.

Graph B1.4. Participation by Tranche of the Underlying Security in the Traded Volume of TES NDF (% of total)

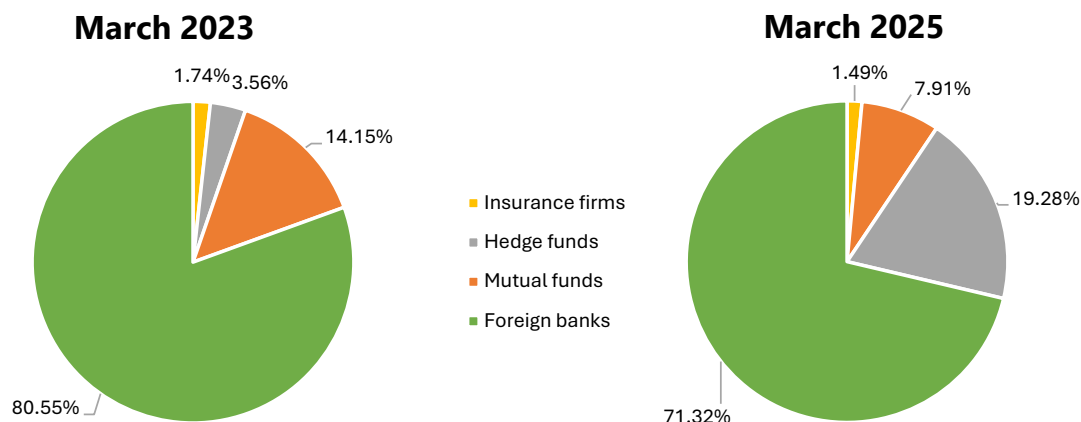


Source: BanRep.

On the side of foreign counterparties, discussions with market agents suggest that most of the final beneficiaries of TES NDF are agents characterized by short-term investment strategies, such as hedge funds⁷. In contrast, foreign investors with a longer-term investment horizon predominate in the spot market, such as monetary authorities and sovereign wealth funds (25% of the total – See *Characterization of foreign investors in the TES spot market*). According to conversations held with local and foreign agents participating in this market, approximately 50% of TES 'buying position in NDF corresponds to hedge funds, mainly from Brazil. Although according to the information reported to *BanRep*, foreign banks appear as the main counterparties in these operations (*Graph B1.5*), these agents usually act on behalf of foreign end customers, who are not included in the reported information.

⁷ Hedge funds are investment funds that hold liquid assets and use complex trading techniques to maximize their returns. They are characteristic for employing an active investment strategy, that is, they hold frequent negotiations and short-term investments in search of returns.

Graph B1. 5. Participation by Type of Foreign Counterparty in the Traded Volume of TES NDF, Identified with the Information Report to Banco de la República.



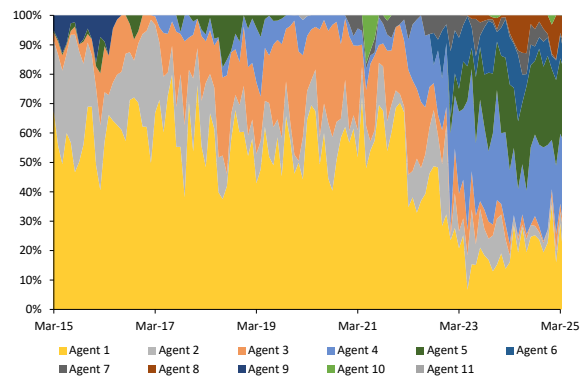
Source: BanRep.

As for local counterparties, TES NDF transactions are mainly channeled through 6 local entities that concentrate 90% of transactions (*Graph B1.6*). Since 2021, the entry of new local counterparties, mainly commercial banks, has been observed, which has contributed to decreasing the concentration of this market, measured through the Herfindahl-Hirschman Index (IHH⁸)⁹, which, in any case, is above the TES spot market (*Graph B1.7*).

⁸ The IHH index is calculated by squared up the participation of each foreign investor within the total of each group and then adding the resulting values. An IHH is considered to be moderately concentrated if it is between 1500 and 2500 points. Above 2500 points it is considered highly concentrated.

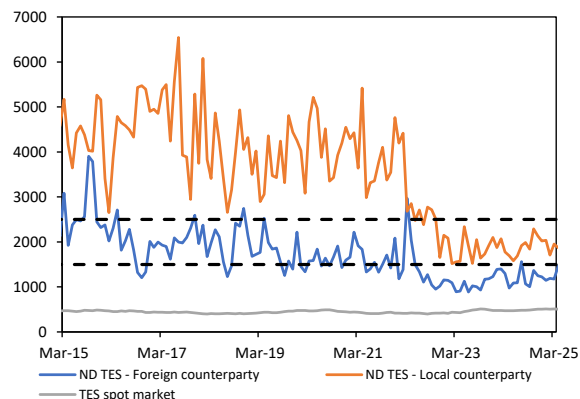
⁹ The IHH index went from an average of 4000 points before 2021, to around 1500 points since that year.

Graph B1.6. Participation by Local Counterparty in the Trading Volume of NDF-TES



Source: BanRep, DCV.

Graph B1.7. IHH* NDF-TES and Cash Market Participants of TES



*The IHH index is calculated by squaring the participation of each foreign investor within the total of each group and then adding the resulting values. An IHH is considered to be moderately concentrated if it is between 1500 and 2500 points. Above 2500, points it is considered highly concentrated.
Source: BanRep, DCV.

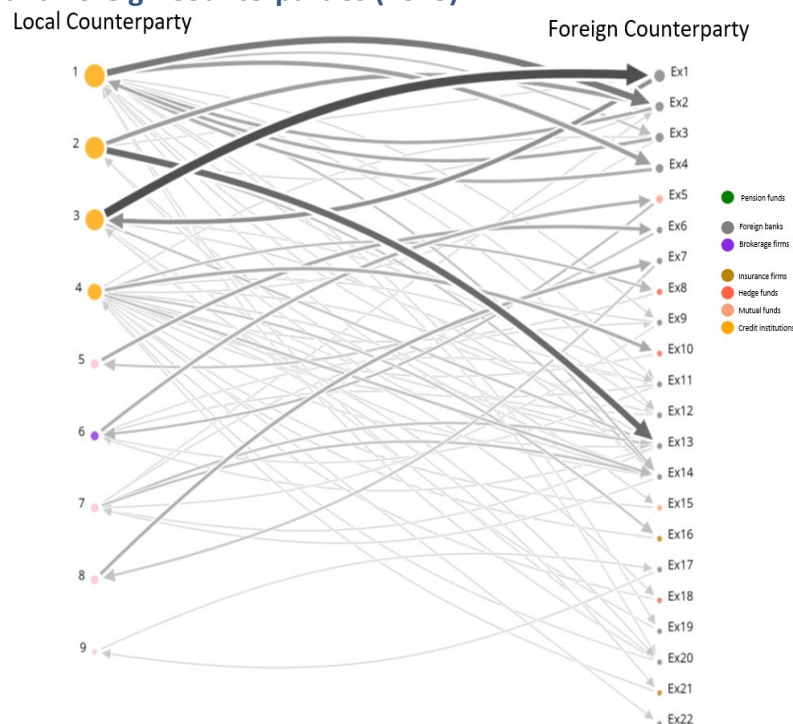
Characterization of Relationships between Participants

Given its OTC nature, the way in which entities are linked is relevant because it allows a more complete overview of the roles that entities have in the market. To this end, it is crucial to utilize network topology, as it is an ideal technique to capture aggregate effects coming from bilateral interactions between market participants.

From *Graph B1.8* it is observed that foreign banks do not maintain exclusive relationships with a single local agent. That means each agent maintains links with more than one local counterpart. This is consistent with a market deepening process that allows, among others, that foreigners have a greater capacity to manage their positions efficiently and diversely.

However, when the foreign bank also operates in the country (i.e., has a supervised local entity that it directly or indirectly controls), the relationship tends to be exclusive between the two entities. This suggests that the NDF exposure of TES of this type of local counterparty is associated with the strategy that the foreign parent bank has with its own customers. In *Graph B1.8*, these relationships are captured with the node "inter credit institution".

Graph B1. 8. Graph of Analysis of Relationships between Local and Foreign Counterparties (2023)



The nodes represent the participating entities of the market. On the left are the local counterparties, while the right contains the foreign counterparties. The edges illustrate the direction of the operation (origin: seller of the NDF; destination: buyer of the NDF). The thickness and shade of these lines represent the traded amount during the period. On the other hand, the size of the nodes reflects the degree of connectivity that the intermediaries present, weighted by the seller amount. At the same time, the color distinguishes the type of entity.

Source: *BanRep*.

Recent Dynamics in the TES NDF Market

Since 2023, the positions of foreign investors in the TES NDF market seem to fit a strategy aimed at taking advantage of expected valuations of TES while finding cheap funding to do so. This strategy is reflected in the difference between TES rates and the Reference Banking Indicator (IBR in Spanish)¹⁰. As seen in *Graph B1.9*, since 2023, the spread between the rates of TES securities and contracts Overnight Interest Swap (OIS¹¹)¹² is at historically high levels. This

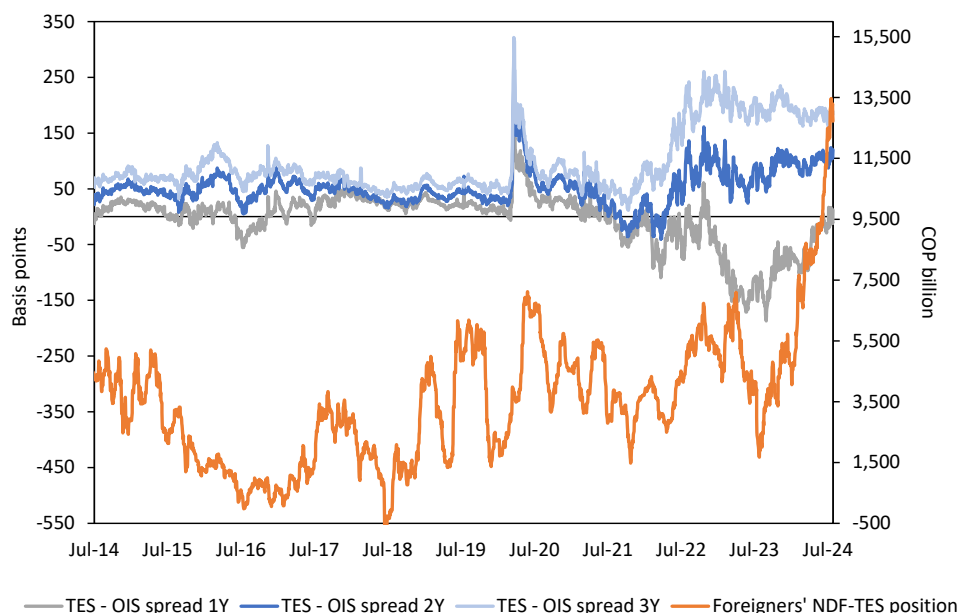
¹⁰ "The IBR is a short-term interest rate for the Colombian peso, which reflects the price at which the agents participating in its training scheme are willing to offer or attract resources in the money market." (Asobancaria, 2024).

¹¹ An OIS is an interest rate swap, with a fixed term, in which the buying party pays the transaction flows at a fixed interest rate, and receives a series of flows at a variable interest rate. The latter is the result of the composition of the IBR overnight rate during the term of the operation. Thus, the fixed rate of OIS contracts corresponds to the average expected IBR rate over the term of the instrument.

¹² To compare the rates of TES with a maturity of more than 1 year with the IBR rate, the rate of OIS contracts must be used, since the maximum term of IBR rates is 1 year.

indicates that TES are significantly undervalued, in line with the high term premiums that have been observed since then.

Graph B1. 9. Differential between the Rates of TES and Overnight Interest Swap (OIS) Contracts vs Buying Position of Foreigners in TES NDF



Source: *BanRep*.

The NDF price depends on the price of the underlying TES, the IBR at the respective term, and a margin charged by local counterparties. In this sense, the incentives of foreign agents respond to the expectations of valuation of the TES and the cost of funding of local counterparties (measured by the IBR at the respective term) plus a margin. Therefore, it is profitable for investors to increase their exposure to the TES NDF market, given their expectations about the future trajectory of the MPR and the expected valuations of the TES. Thus, this dynamic also coincides with the start of the rate cut cycle in Colombia. This is due to the prices agreed in these contracts being calculated by carrying the spot price of the underlying TES into future value using the IBR rate (which captures expectations about the MPR). Thus, when there is a high differential between the two rates, prices agreed in the TES NDF are attractive as they are lower than spot prices, which represents a profit opportunity in case of valuation of TES.

Thus, the business of local intermediaries lies in transferring to foreign investors the cost of funding (measured by the IBR at the respective term), plus an intermediation margin, of the position they open in the TES cash market to cover the sale of the NDF. In this sense, the banks have incentives to offer TES NDF contracts as far as the intermediate margin is positive and of an attractive magnitude for them¹³.

As an example, it is assumed that a foreign investor acquires an NDF purchase contract, with a term of 30 days, on a TES in pesos expiring in 2026 (Table B1. 1). Assuming that this negotiation

¹³ The agents consulted indicated that the magnitude of that margin depends on the liquidity conditions at the time of opening the contract.

is conducted on July 1, 2024, the foreigner would receive a quotation of the spot price of the underlying TES on that date equal to 102.7, and an IBR rate at the term of the contract (30 days) equal to 10.7%. Additionally, the commercial bank with which it trades charges an intermediation margin of 30 bps.

According to the Colombian Stock Exchange, the price agreed in the TES NDF is calculated under the formula:

$$P_{agreed} = P_{spot} * (1 + IBR_{term} + margin)^{term/365}$$

Where:

- P_{agreed} : corresponds to the price agreed on the date of negotiation of the NDF of TES
- P_{spot} : corresponds to the spot market price of the security used in the TES' NDF on the expiration date of the contract.
- $term$: corresponds to the term of the TES' NDF contract.
- IBR_{term} : corresponds to the IBR to the term of the TES' NDF contract.
- $margin$: corresponds to the margin that the local counterparty charges over IBR_{term} for opening the TES' NDF contract.

Thus, in this case, the contract is beneficial for the foreigner since the valuation of the TES during the period of the contract was higher than that of the IBR in that same period. Applying this expression, the price agreed in the 30-day contract would be 103.6. Thus, at the 30-day contract maturity, the agreed price (103.6) is compared with the spot price of the TES at that date (August 1, 2024), which was 104.9.

Table B1. 1. Example of Valuation of a TES NDF

Contract Negotiation		Contract Maturity	
Underlying TES:	TESCOP26	Underlying TES:	TESCOP26
Price (July-1-24) (A):	102.7	Price (Aug-1-24):	104.9
Yield (July-1-24):	9.4%	Yield (Aug-1-24):	8.6%
Funding (IBR1M – July-1-24) (B):	10.7%	TES gains:	27.9%
Margin (bp) (C):	30		
NDF term (days) (D):	30		
Strike price (Aug-24) (A*(1+B+C)^(D/365))	103.6		

Source: *BanRep*.

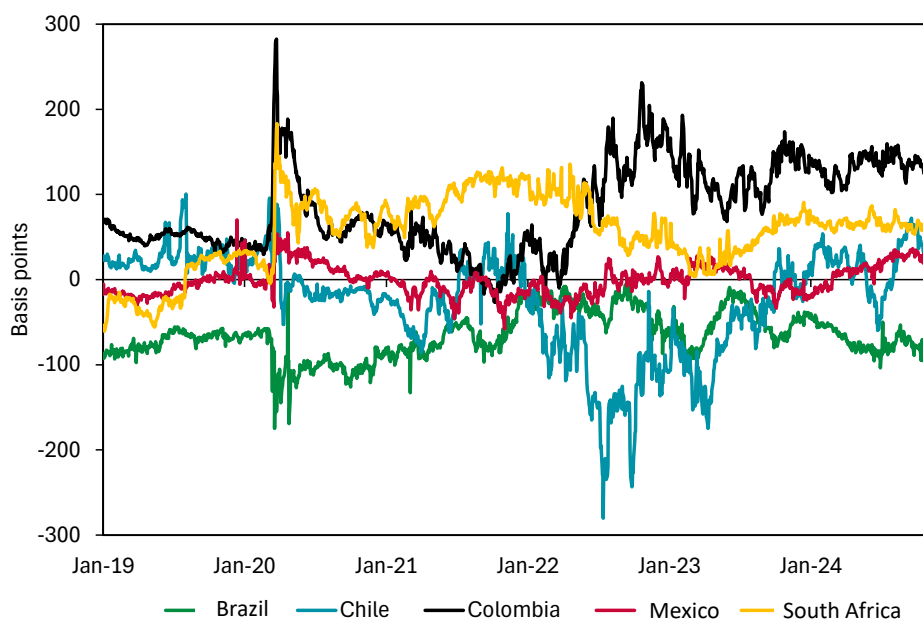
Note: The table shows the example of valuation of a TES' NDF with a term at maturity of 30 days, on July 1, 2024, on a TES reference denominated in pesos with maturity in 2026.

The spot market price of this reference as of July 1, 2024, was 102.7, and its rate of return 9.4%; the funding rate used for the valuation of this NDF is the 1-month IBR, which as of July 1, 2024 was 10.7%; it is assumed that the

intermediary charges a margin of 30 basis points on the funding rate; thus, the price agreed in this NDF contract is 103.6; as of August 1, 2024, the underlying TES reference has a spot market price of 104.9 and a rate of return of 8.6%, so its valuation during the 3 days that the contract was in force was 27.9%.

In this context, the high differential between TES rates and OIS contracts, as observed since 2023, could be partly explained by the forward premium component in TES rates. This premium could be related to factors such as the inflationary risk premium, the fiscal deficit, the risk appetite in emerging countries, among others (*See Factors that may affect the resistance of the yield curve in Colombia to be inverted*).

Graph B1.10. Differential between the Rate of Public Debt Bonds and Two-Year OIS Contracts for Colombia and Peers (bp)



Source: Bloomberg.

Additionally, the differential is not only at elevated levels compared to its historical levels but also compared to our peers. In Graph B1.10, the spread between the rate of public debt bonds and two-year OIS contracts for Colombia and a group of peer countries is depicted. Colombia's differential is above that of all countries since 2023, which coincides with a significant increase in the purchasing position of foreigners in TES NDF. This suggests that the considerable entry of foreigners into this market could be motivated by the relative attractiveness of the Colombian market compared to others with similar conditions.

Conclusions

Since July 2023, foreign investors have significantly increased their buying position in TES NDF, going from COP 4 t before that year, to COP 21 t at the end of 1Q25. This dynamic coincides with the beginning of the cycle of rate cuts in Colombia, as well as expectations of further cuts in the medium term, and a historically high differential between the rates of the TES and the IBR/OIS in Colombia compared to similar countries.

Local counterparties, mostly commercial banks, usually assume the selling position in these contracts vis-à-vis foreigners, then hedge by purchasing TES on the spot market. Given that channel, the deepening of the TES NDF market could have an impact on the liquidity of the TES spot market. However, a disorderly dismantling of the purchasing position of foreigners in TES NDF, motivated, for example, by a change in their expectations on the valuation of TES or on the rate of reduction of MPR, could generate significant selling pressure by local counterparties in the TES spot market.

Characterization of transactional relationships between local and foreign agents suggests a process of market deepening. Despite being an OTC market, where transactions are conducted bilaterally, it is observed that foreign banks operate with multiple local counterparties in the same period. Likewise, it is particularly noteworthy that when local banks have a parent company abroad, they tend to operate the product preferentially with the latter. These features are relevant because they provide elements to gain a greater understanding of the market microstructure.

Based on discussions with market agents, foreign investors participating in the TES NDF market would primarily be hedge funds, characterized by short-term investment strategies. These types of agents are estimated to represent approximately 50% of the purchasing position of foreigners in this market, while in the spot market, agents with a longer-term investment horizon predominate, such as monetary authorities and sovereign wealth funds (25% of the total).