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Abstract

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides participating formula fed infants with free infant formula. This study estimates that, in 2020, about half of all infant formula in the United States was consumed by WIC infants. Federal law requires that WIC State agencies use a cost containment system to reduce infant formula costs. Most State agencies use a single supplier, competitively bid rebate program. The State agency awards a contract to the infant formula manufacturer offering the lowest net wholesale price per unit of infant formula, defined as the difference between the manufacturer's wholesale price and the manufacturer's rebate to the State agency. This study summarizes recent trends in State agencies' infant formula rebate contracts and examines how factors, such as declining shares of infants born in the United States participating in WIC, contribute to these trends. Compared with previous contracts, contracts in effect in March 2023 resulted in greater savings to WIC for infant formula purchases. After adjusting for inflation, net wholesale prices decreased by $1.49 per 90 fluid ounces of reconstituted formula from previous contracts on average.

Keywords: Special Supplemental Nutrition Program for Women, Infants, and Children, WIC, infant formula, rebate program, wholesale price

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About the Authors

Leslie Hodges (corresponding author) and Jessica E. Todd are research agricultural economists with the USDA, Economic Research Service. David E. Davis (senior author) is a professor of economics at South Dakota State University.

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A report summary from the Economic Research Service *April 2025*

Manufacturers' Bids for Infant Formula Rebate Contracts, 2013–23

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What Is the Issue?

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides iron fortified infant formula to low-income and nutritionally vulnerable infants. Federal law requires that WIC State agencies operate cost containment systems to reduce formula costs. Most State agencies use competitive bidding to award contracts to issue a single manufacturer's infant formula as the first-choice formula to WIC participants. In return, the manufacturer offers State agencies a discount in the form of a rebate on each unit of formula purchased through WIC. State agencies award contracts to the manufacturer offering the lowest net wholesale price, which is the difference between the manufacturer's wholesale price and the rebate (summary figure).

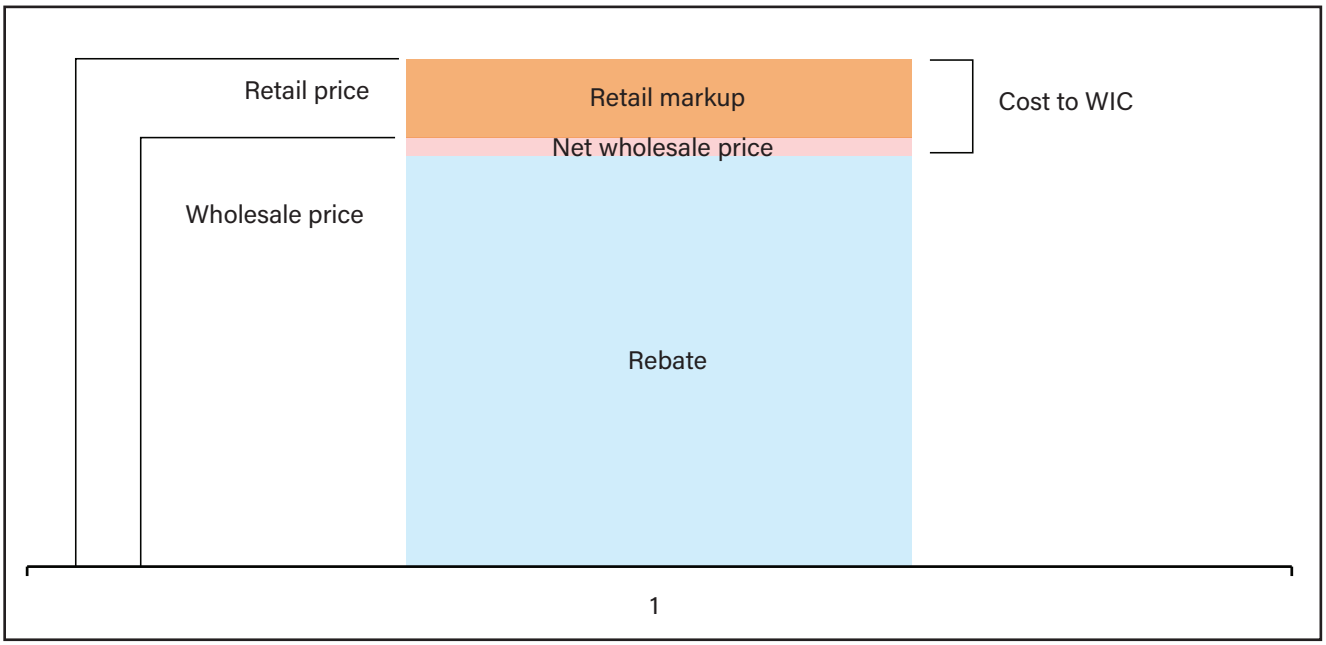
USDA's Economic Research Service (ERS) periodically reports on WIC's infant formula costs, which are determined by contracts with formula manufacturers. This report examined manufacturers' bids for State agency contracts awarded from 2013 to 2023. This period was marked by U.S. birth rate declines, declines in the number of infants enrolled in WIC, as well as two major economic events impacting the infant formula market: the Coronavirus (COVID-19) pandemic and infant formula supply chain disruptions in 2022 (Hodges et al., 2024). Monitoring trends in infant formula rebate contracts is important because the contracts influence what WIC—and ultimately U.S. taxpayers—pay for infant formula. WIC receives a fixed amount in appropriations each year, so saving on the foods that WIC provides maximizes the number of participants the program can serve.

What Did the Study Find?

For infant formula rebate contracts in effect in March 2023, WIC State agencies, on average, received rebates that exceeded manufacturers' wholesale prices for their formula. The national average percent discount, or the rebate as a percentage of the wholesale price, was 108.6 percent.

Contracts in effect in March 2023 resulted in greater savings to WIC on infant formula purchases compared with previous contracts. Adjusting for inflation to 2023 dollars and holding caseloads constant, WIC State agencies paid an estimated $131 million per year less on the wholesale price of infant formula under new contracts.

Cost components for a unit of infant formula in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)



Note: Unit refers to a 12–13 ounce can of powder formula, about 90 reconstituted fluid ounces of formula; a 13-ounce can of liquid concentrate formula, 26 reconstituted fluid ounces of formula; and a 32–48 fluid ounce bottle of ready-to-feed formula.

Source: USDA, Economic Research Service.

Both lower wholesale prices of formula and higher rebates offered by manufacturers contributed to the savings. Real (i.e., inflation adjusted) wholesale prices decreased by an average of $1.23 per 90 fluid ounces of reconstituted formula. Real rebates increased by an average of $0.26 per 90 reconstituted ounces. Because of the decrease in wholesale prices and the increase in rebate amounts, real net wholesale prices (i.e., the amount of the wholesale price paid by WIC after the manufacturer rebate is applied) decreased by an average of $1.49 per 90 reconstituted ounces.

Manufacturers' net wholesale price bids are positively correlated with the share of infants participating in WIC. On average, when the share of infants in a State participating in WIC decreases by 10 percentage points, net wholesale price bids decrease by an estimated $1.14.

How Was the Study Conducted?

We examined the bids submitted to WIC State agencies by infant formula manufacturers for milk-based powder formula between July 2013 and March 2023, compiled by USDA, Food and Nutrition Service for programmatic purposes. Net prices were converted to a standard unit (i.e., 90 fluid ounces of reconstituted formula) and were adjusted for inflation to constant 2023 dollars using the Consumer Price Index for All Items for Urban Consumers (U.S. Department of Labor, Bureau of Labor Statistics (BLS), 2023).

We calculated and compared changes in net wholesale prices, wholesale prices, and rebates between contracts in effect in March 2023 and previous contracts. We used linear regression models with State agency fixed effects to analyze the association between net wholesale price bids and the share of infants participating in WIC. The fixed effects accounted for State agency specific factors that affected net wholesale prices and were constant over time.

Manufacturers' Bids for Infant Formula Rebate Contracts, 2013–23

Introduction

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides supplemental food, nutrition education, and referrals to health care and other social services to low-income, nutritionally vulnerable pregnant and postpartum women, infants, and children up to 5 years of age. WIC is based on the premise that early intervention during critical times of children's growth and development can help prevent future medical and developmental problems. WIC is jointly administered by the U.S. Department of Agriculture's (USDA) Food and Nutrition Service (FNS), which oversees the program at the Federal level, and 88 State agencies,[1] which are responsible for program operations within their jurisdictions. About 40 percent of all infants in the United States participated in the program each month in fiscal year 2021 (Hodges et al., 2024).[2]

WIC recognizes and promotes breastfeeding as the optimal source of nutrition for infants. In addition to breastfeeding support, WIC provides iron fortified infant formula to formula fed infant participants to ensure that they receive adequate nutrition, consistent with the 2020–25 Dietary Guidelines for Americans recommendations (U.S. Department of Agriculture (USDA) and U.S. Department of Health and Human Services (DHHS), 2020). Most infants in the United States are fed some formula, and rates of formula feeding among infants participating in WIC are higher than those not participating in WIC.[3] As a result of the large share of U.S. infants who participate in WIC and the lower prevalence of breastfeeding among participating infants, WIC is the major purchaser of infant formula in the United States. We estimated that half (50.0 percent) of all infant formula in 2020 was consumed by WIC participants (appendix A).

To reduce the costs of infant formula to WIC, Federal law requires that WIC State agencies serving more than 1,000 infants operate a cost containment system for the purchase of infant formula.[4] All WIC State agencies that operate a cost containment system use a single source competitive bidding processes to award contracts to a manufacturer to be the single provider of infant formula to WIC program participants in that State. In return, the manufacturer offers the State agency a discount in the form of a rebate on the wholesale price of each unit of formula purchased through WIC.[5]

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[1] As of fiscal year 2025, 88 agencies administer WIC. This number includes all 50 U.S. States, Washington, DC, 5 U.S. territories, and 32 Indian Tribal Organizations. At the time the analyses for this study were conducted, 89 agencies administered WIC. Although the agencies administering WIC are not all States, we refer to each administering agency as a "State" agency for simplicity and following norms in the program's administrative documents.

[2] This estimate is consistent with estimates from USDA, FNS that 39 percent of infants in the U.S. population participated in WIC in 2022 (Kessler et al., 2024).

[3] The data on breastfeeding from the National Immunization Survey indicated that among children born in 2020, 43 percent of those participating in WIC were estimated to be breastfeeding at 6 months, compared with 62 percent of infants who were eligible for WIC but did not participate and 72 percent of infants not eligible to participate in WIC (DHHS, Centers for Disease Control and Prevention (CDC), 2023). This higher rate of formula feeding among WIC-participating infants (compared with income-eligible nonparticipants) is likely due to factors such as differences in preferences for breastfeeding and not due to participation in WIC (for more information, see box, "Why Do Some WIC Participants Choose Not To Breastfeed?").

[4] Infant formula is the only WIC food item for which Federal law requires that WIC State agencies operate a cost containment system for its procurement, but most State agencies implement additional cost containment strategies. For more information on cost containment practices in WIC, see Gleason et al. (2021).

[5] WIC State agencies can operate an alternative cost containment system if such a system provides savings equal to or greater than a single supplier competitive system 7 CFR 246.16a(d). No State agency currently operates an alternative system.

Manufacturer rebates are a significant source of cost savings to WIC. Before rebates, infant formula costs to WIC amounted to $2.2 billion in fiscal year 2018 (a typical year) (Kline et al., 2020). After rebates, infant formula costs to WIC dropped by 77 percent to $514 million (Kline et al., 2020). Monitoring trends in rebates is important because net wholesale prices (or the wholesale price of formula after rebates), along with retail markups, are what the Federal Government—and ultimately U.S. taxpayers—pay for infant formula provided through WIC. Since the manufacturers choose to bid for WIC infant formula rebate contracts and choose how much of a rebate to offer, the size of the rebate provided by formula manufacturers, and therefore the net wholesale price, are outside the direct control of WIC State agencies.[6] Because of the large volume of formula provided through the program, even small increases in per-unit formula costs can raise program costs.

In this report, we summarized recent trends in manufacturers' bids for infant formula rebate contracts and estimated the impacts of changes in net wholesale prices on total infant formula costs to WIC. We extended previous USDA, Economic Research Service (ERS) research on trends in infant formula rebate contracts (Oliveira & Davis, 2006; Oliveira et al., 2010; Davis & Oliveira, 2015) by incorporating data from 2013 through March 2023. This period was marked by birth rate declines in the United States, declines in the number of infants participating in WIC, as well as two major economic events impacting the infant formula market: (1) the Coronavirus (COVID-19) pandemic and (2) infant formula supply chain disruptions in 2022 (Hodges et al., 2024; National Academies of Sciences, Engineering, and Medicine (NASEM), 2024; U.S. Food and Drug Administration (FDA), 2023).[7]

Why Do Some WIC Participants Choose Not To Breastfeed?

Historically, WIC participants have had lower breastfeeding rates than nonparticipants, including those who are eligible to participate but do not enroll in WIC (U.S. Department of Health and Human Services (DHHS), Centers for Disease Control and Prevention (CDC), 2022). While WIC offers infant formula at no cost to participants, since the early 1990s the program has provided breastfeeding education and breastfeeding aids (such as pumps) through its nutrition services and administration funds. The program also provides additional supplemental foods to breastfeeding participants.

Lower breastfeeding rates among WIC participants relative to WIC-eligible nonparticipants may be due to differences in the characteristics of those who choose to participate in WIC and those who do not, rather than due to an adverse effect of the program on breastfeeding. In previous research, WIC participants, on average, were found to have characteristics associated with lower rates of breastfeeding (Tiehen & Jacknowitz, 2010). Some of these characteristics included being younger than 20 years old, being unmarried, smoking, not having graduated high school, and being more likely to have a household income below poverty compared with eligible women who do not enroll in the program (Tiehen & Jacknowitz, 2010). Research examining WIC's effect on infant feeding choices has attempted to account for these observable characteristics, as well as possible unobservable differences, and has generally found that WIC does not reduce the probability that an infant is breastfed (Caulfield et al., 2022).

[6] State agencies limit food costs, including infant formula, to some extent by establishing maximum allowable reimbursement levels for WIC foods/food packages that are specific to vendor groups, where the types of groups are based on vendor characteristics such as: store type, geography, number of cash registers, WIC sales volume, gross food sales volume, and square footage of the store. For more information on maximum allowable reimbursement levels, see Gleason et al. (2022).

[7] For a detailed accounting of the supply chain disruptions, see FDA (2023) and NASEM (2024).

How Competitive Bidding for Infant Formula Rebates Works

Since 1989, Federal law has required that all WIC State agencies operate a single supplier competitive bidding cost containment system for the procurement of infant formula[8] (7 CFR 246.16a). The law includes exceptions for State agencies using home delivery (e.g., Vermont until 2016) or direct distribution food delivery systems (e.g., Mississippi until 2021) or Indian Tribal Organizations with 1,000 or fewer participants (see appendix B, "The Origins of the Rebate Program").[9]

Under single supplier competitive bidding, a WIC State agency or a group of WIC State agencies (see box, "Multistate Alliances") awards a contract to a single manufacturer to issue the manufacturer's infant formula as the formula of first choice to its infant participants. The contracts exclude infants that are exclusively breastfed or infants that, due to medical reasons, require some other type of formula, which are referred to as exempt[10] and noncontract infant formulas. The State agency specifies the standardized number of units of infant formula to be bid upon, which must contain the equivalent of the total number of ounces by physical form (powder, liquid concentrate, ready to feed) needed to give the maximum allowance to the average monthly number of infants using each form. The average monthly number of infants using each physical form is based on at least 6 months of the most recent participation and issuance data.

The awarded contract goes to the bidder offering the lowest total net wholesale price, as determined by the submission of sealed bids, for the set amounts of primary contract infant formula in each of the three forms.[11] The primary contract infant formula is the product for which the rebate is being specified, for example, Similac® Advance® (Abbott), Enfamil® Infant (Mead Johnson), and Gerber® Good Start® Gentle (Gerber®).

The net wholesale price is defined as the difference between the manufacturer's lowest wholesale price per unit for a full truckload of the primary contract infant formula on the date of the bid opening and the rebate offered.[12] All further references to wholesale price in this report, unless otherwise noted, will refer to the wholesale price per unit for a full truckload of infant formula.

$$\text{Net wholesale price} = \text{Wholesale price} - \text{Rebate}$$

If the manufacturer's wholesale price changes at any time over the life of the contract, the amount of the rebate provided by the manufacturer changes on a cent-for-cent basis. This means that the net wholesale price remains fixed over the life of the contract, but the rebate as a percent of the wholesale price will vary.

[8] Or an alternative system that provides equal or greater savings. However, no State agency operates an alternative system.

[9] Home food delivery systems are "systems in which authorized supplemental foods are delivered to the participant's home" (7 CFR 246.12(m)). Direct distribution food delivery systems are "systems in which participants, parents or caretakers of infant or child participants, or proxies pick up authorized supplemental foods from storage facilities operated by the State agency or its local agencies" (7 CFR 246.12(n)). All State agencies now operate retail food delivery systems, or "systems in which participants, parents or caretakers of infant and child participants, and proxies obtain authorized supplemental foods by submitting a food instrument or cash-value voucher to an authorized vendor" (7 CFR 246.12(e)).

[10] Exempt formulas refer to FDA requirements for infant formulas for infants who have inborn errors of metabolism or other medical or dietary problems (21 CFR 107.3). These formulas are prescribed by a physician and are not typically found on retail store shelves.

[11] Although WIC usually issues formula in powder form, formula may be issued in the ready-to-feed form in special situations, such as when the participant's household has an unsanitary or restricted water supply or poor refrigeration or if the person caring for the infant may have difficulty in correctly diluting concentrated forms or reconstituting powdered forms (7 CFR 246.10).

[12] For WIC formula purchased in less than full truckload volumes, the manufacturer may receive wholesale prices that exceed the amount specified in the contract. The share of formula purchased through WIC that is purchased in volumes less than a full truckload (and thus, at higher wholesale prices) is unknown.

Ensuring Competition and Transparency in the Bidding Process

Several steps in the bidding process help to ensure competition and transparency. First, manufacturers and the public receive at least 30 days notice that the WIC State agency plans to award a new contract. This notice gives all manufacturers competing for the contract the same amount of time to prepare a bid. Next, the manufacturers bidding on the new contract enter sealed bids. This process aims to prevent manufacturers from coordinating bid amounts by restricting them from publicly announcing the amounts that they plan to bid. In the early 1990s, manufacturers' public announcements of planned bids led to lower rebates and less savings to WIC, and such practices were determined to be anti-competitive (Carlson et al., 2017). Finally, the sealed bids are publicly opened and read aloud on the day that they are due, making the names of the manufacturers that bid on the contracts and the wholesale prices, rebate amounts, and net wholesale prices of every bid known to the public. The State agency awards the new contract to the manufacturer offering the lowest net wholesale price bid. For more information about the bidding process, see the Code of Federal Regulations, 7 CFR 246.16a.

In addition to the primary contract infant formula, all infant formulas (except exempt infant formula) produced by the manufacturer awarded the rebate contract are referred to as contract infant formulas. The manufacturer is required to provide a rebate for all the contract brand infant formulas it produces. Abbott contract brand infant formulas would include products such as Similac® Sensitive. Mead Johnson contract brand infant formulas would include products such as Enfamil A.R.™ and Enfamil® Reguline®. WIC State agencies may allow participants to purchase some, all, or none of the winning manufacturer's other contract brand formulas, but they must issue the primary contract infant formula as the formula of first choice. As a result, the specific infant formula products provided through WIC may differ for State agencies that hold contracts with the same manufacturer.

The amount of the rebate on other contract infant formulas is based on the same percent discount (i.e., the rebate as a percentage of the wholesale price) for the physical form of the primary contract infant formula. For example, if the rebate offered for the primary contract powdered infant formula is 90 percent of the manufacturer's wholesale price, then a rebate of 90 percent would apply to the wholesale prices of all other powdered forms of contract infant formula, including soy-based powder under single solicitation (see box, "Single and Separate Solicitation").

The contract term (i.e., the period during which the infant formula rebate contract is in effect) also varies across States. On average, the most recently completed contracts, including contract extensions, lasted 56 months (see appendix C for the dates on which each State's current and previous contracts became effective). Before the expiration of a contract and its extensions, a new contract for that State goes up for bid.

The production of infant formula in the United States is highly concentrated and has been since at least the 1980s (Hodges et al., 2024). In 2022, three manufacturers, including Mead Johnson[13] (maker of Enfamil® product line), Abbott[14] (Similac®), and Gerber®[15] (Good Start®), accounted for 83 percent of sales of infant formula in the United States (FDA, 2023). Since the mid-1990s, all infant formula rebate contracts have been held by one of these three major infant formula manufacturers.

[13] In 2017, the Mead Johnson Nutrition Company merged with Reckitt Benckiser Group (RB) and became a division of RB.

[14] Ross Products changed to Abbott Nutrition in 2007; Abbott Laboratories has owned Ross Products since 1964.

[15] Nestlé acquired Gerber® in 2007, and in February 2010, the brand name of Nestlé's line of infant formulas was changed to Gerber®. In November 2022, Nestlé sold the Good Start® brand name to Perrigo, along with an infant formula manufacturing facility (Nestlé, 2022). Gerber's® last bid on an infant formula contract was in November 2021.

Because of the bidding process, the manufacturer holding the infant formula contract for a WIC State agency will vary over time. In 12 contracts representing 18 State agencies, the manufacturer that held the contract as of March 2023 was different from the one that held the previous contract.[16] In the remaining 16 contracts representing 34 State agencies, the current contract holder also held the prior contract (for current and prior contract holders, see appendix C; for contract holders by State agency since 1996, see appendix D).

Multi-State Alliances

Some State agencies have formed multi-State alliances and jointly request rebate bids. In these cases, each WIC State agency in the alliance receives the same rebate and pays the same net wholesale price. Forming a multi-State alliance allows State agencies to pool their buying power to leverage higher rebates (Liu, 1991; Davis, 2014).

The Child Nutrition and WIC Reauthorization Act of 2004 prohibited the formation of alliances if the total number of infants served by the alliance exceeds 100,000. Alliances with more than 100,000 infants as of October 2003 were exempt from this prohibition. Any alliance in existence as of October 2003 may serve more than 100,000 infants if caseloads grow. The alliance may not expand to include any additional State agencies, except if the State agency to be added served fewer than 5,000 infants as of October 2003. The rule grew out of concern that not all infant formula manufacturers may be able to compete for larger multi-State contracts due to production capacity and/or distributional issues, which could limit competition among infant formula manufacturers for rebate contracts (Federal Register, Volume 73, Number 42).

As of March 2023, WIC State agencies in all 50 States, Washington, DC, 5 territories, and 15 Indian Tribal Organizations used competitive bidding processes to award infant formula contracts. Of these State agencies, 31 States, Washington, DC, 4 territories, and 14 Indian Tribal Organizations were part of alliances.

- The National Association of State Procurement Officials (NASPO), formerly the Western States Contracting Alliance (WSCA), includes 14 States (Alaska, Arizona, Delaware, Hawaii, Idaho, Kansas, Maryland, Montana, Nevada, Oregon, Utah, Washington, West Virginia, and Wyoming), Washington, DC, 4 territories (American Samoa, Guam, the Virgin Islands, and the Commonwealth of the Northern Mariana Islands), and 5 Indian Tribal Organizations (Inter-Tribal Council of Arizona, Inter-Tribal Council of Nevada, Navajo Nation, Osage Nation, and Pueblo of Isleta).
- The New England and Tribal Organization (NEATO) alliance includes six States (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont (as of 10/1/2021)) and the Cherokee Nation of Oklahoma.
- The Mountain Plains Region (MPR) alliance includes four States (Missouri, Nebraska, South Dakota, and North Dakota (beginning 10/1/2021)).
- The Southwest/Southeast Regions (SSR) alliance includes three States (Arkansas, New Mexico, and North Carolina).
- The Southwest/Mountain Plains/Midwest Regions (SMPMR) alliance includes three States (Iowa, Minnesota, Texas) and the Choctaw Nation of Oklahoma.

Continued on next page ►

[16] Alliances combine WIC agencies from States, Indian Tribal Organizations, territories, and Washington, DC. For our analysis, we focus on State agencies that represent a U.S. State or have more than 1,000 fully formula fed participating infants. Given this convention, the 28 contracts we examined represent 52 State agencies: the 50 U.S. States, Washington, DC, and Puerto Rico.

◄ Continued from previous page

- The Oklahoma State Alliance includes Oklahoma and seven Indian Tribal Organizations (Chickasaw Nation; Citizen Potawatomi Nation; Eight Northern Indian Pueblos, Incorporated; Mississippi Band of Choctaw Indians; Muscogee (Creek) Nation; Otoe-Missouria Tribe; and WCD (Wichita, Caddo, and Delaware Tribes) Enterprises, Incorporated).

The remaining 19 States (Alabama, California, Colorado, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Michigan, Mississippi, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and Wisconsin), Rosebud Sioux Tribe, and Puerto Rico held their own contracts. Another 18 Indian Tribal Organizations had 1,000 or fewer participants and did not use cost containment procedures for infant formula.

Single and Separate Solicitation for Milk- and Soy-Based Formulas

Some infants may require soy-based formulas because they have a milk allergy or cannot tolerate lactose (the protein in milk-based formulas). There are two ways that State agencies obtain rebates for soy-based formulas: (1) single solicitation and (2) separate solicitation.

Under a single solicitation, the request for bids on the primary contract formula specifies an iron-fortified, milk-based infant formula that is suitable for routine issuance to most generally healthy, full-term infants. Additionally, the bid solicitations require the winning bidder to provide a rebate on all infant formulas it produces, including a soy-based infant formula product. Bidders that do not produce a soy-based infant formula are required to subcontract with another manufacturer to supply a soy-based infant formula.

Under separate solicitations, bids are issued separately for milk-based and soy-based infant formulas. As a result, two different manufacturers could hold infant formula contracts with a State agency. Separate solicitations may increase competition for WIC contracts by allowing new or smaller infant formula manufacturers with a limited product line to bid on contracts (Federal Register, Volume 65, Number 164).

All State agencies and alliances that served a monthly average of more than 100,000 infants during the preceding 12-month period are required to issue separate bid solicitations for milk-based and soy-based infant formula (7 CFR 246.16a). As of March 2023, three individual States (California, Florida, and New York), and two alliances (Western States Contracting Alliance and Southwest/Mountain Plains/Midwest Region Alliance) issued separate solicitations.

What WIC Pays for Infant Formula

WIC State agencies primarily provide infant formula to WIC infants via the retail food delivery system, which means that the infants' parents or caretakers obtain infant formula from WIC-authorized retail vendors (i.e., grocery stores) using an electronic benefits transfer (EBT) card that specifies the brand and amount of formula that can be acquired.[17] WIC reimburses authorized retailers for the full retail price of the formula (wholesale price + retail markup). WIC State agencies then receive a rebate on the wholesale price of the formula from the contract holding manufacturer. Thus, a simple expression of the final costs to WIC for a unit of formula is:

Cost to WIC = Retail price – Rebate.

[17] In some limited circumstances, State agencies provide infant formula via direct distribution or home delivery systems.

The final costs to WIC for a unit of formula can also be expressed in more detail as:

Cost to WIC = Net wholesale price + Retail markup, where

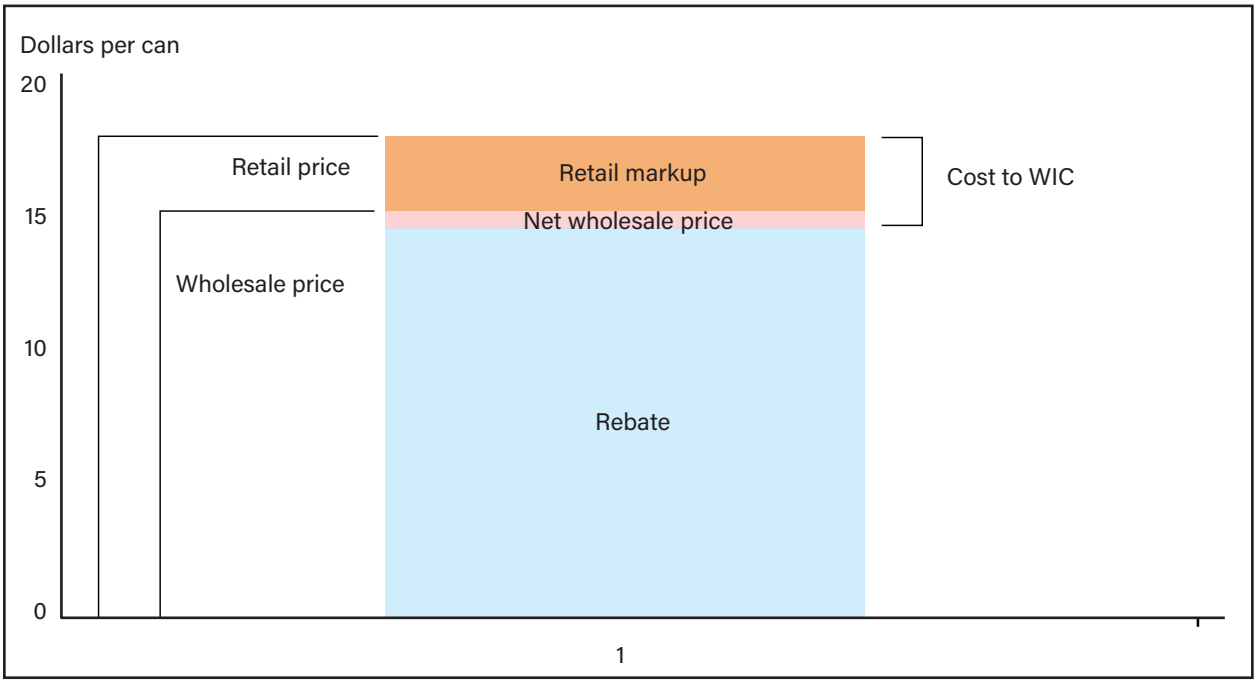
Net wholesale price = Wholesale price – Rebate; and

Retail markup = Retail price – Wholesale price.

The relationships between these expressions are illustrated in figure 1, which shows the cost components for a unit of infant formula in WIC. Figure 1 helps to demonstrate that when rebate amounts are large relative to the wholesale price, the retail markup—not the net wholesale price—becomes the largest component of infant formula costs to WIC. When rebate amounts exceed the wholesale price, the amount of the retail markup paid by WIC is reduced as well.[18]

What WIC State agencies pay for infant formula depends on two different market agents: (1) infant formula manufacturers and (2) retailers. In our analysis for this report, we focused on the costs determined by infant formula manufacturers, documenting trends over time in net wholesale prices and their components, wholesale prices and rebates.

Figure 1
Cost components for a can of milk-based powder infant formula based on the winning net wholesale price bid for the New Jersey WIC contract in 2018



WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

Note: This example is based on (1) the average unit retail price of a 12.5 ounce can of milk-based powder infant formula in the Northeast Region of the United States (as defined by the U.S. Department of Commerce, Bureau of the Census) for calendar year 2018 and (2) the wholesale price and rebate amount for the winning net wholesale price bid in New Jersey in 2018.

Source: USDA, Economic Research Service using Circana OmniMarket Core Outlets 2016–18 data and USDA, Food and Nutrition Service data.

[18] Figure 1 shows a scenario in which the rebate amount does not exceed the wholesale price, in which case WIC pays the manufacturer a portion of the wholesale price of each unit of infant formula purchased through WIC. When the rebate exceeds the wholesale price, the manufacturer pays WIC the wholesale price and a portion of the retail markup for each unit of infant formula.

Data and Methods

We examined the bids submitted to WIC State agencies by infant formula manufacturers for milk-based powder formula between July 2013 and March 2023, compiled by USDA, Food and Nutrition Service for programmatic purposes (USDA, FNS, 2023a). Specifically, we compared each contract in effect in March 2023 with the most recent previous contract (see appendix C for the start dates of current and prior contracts). We focused on changes in net wholesale prices and their components, wholesale prices and rebates, and we estimated the impacts of changes in net wholesale prices on total infant formula costs to WIC. The data included 28 contract changes (56 contracts) representing WIC State agencies from all 50 U.S. States; Washington, DC; 14 Indian Tribal Organizations; and 5 U.S. territories.

In additional analysis, we included bid data from earlier periods. This provided a continuation of analysis from previous USDA, ERS studies of infant formula bids. We looked at historical trends in wholesale prices from 2005 to 2023, extending the analyses from Oliveira and Davis (2006) that ended in 2005. We considered how manufacturers' net wholesale price bids differed across contracts in our study period, comparing our findings to a similar analysis conducted by Davis and Oliveira (2015) that covered 2003 to 2013. We also explored the association between net wholesale price bids and the share of infants participating in WIC, using a linear regression model with State agency fixed effects and a longer series of bid data covering 1998 to 2023.

We limited our analysis to bids for milk-based infant formula in powder form, the predominant type of formula WIC provides.[19] Both container size and reconstitution yield may vary by brand and may change over time for the same product. For comparison purposes, we converted wholesale prices, rebates, and net wholesale prices to a standard unit of 90 reconstituted fluid ounces, which is the most common amount of reconstituted formula provided by a can of powder formula during the study period.[20]

Net wholesale prices are set at the time of the bid opening and remain fixed over the length of the contract. If the manufacturer changes the wholesale price during the contract, the rebate amount changes cent for cent. Although the nominal net wholesale price does not change while a contract is in effect, the real net wholesale price will decrease over time due to rising prices in the economy (i.e., general price inflation).

To account for inflation, we adjusted all nominal prices from the starting month and year of a contract to January 2023 dollars (real dollars), using the Consumer Price Index for All Items for Urban Consumers (CPI-U), the most widely used measure of general price changes in the economy (U.S. Department of Labor (DOL), Bureau of Labor Statistics (BLS), 2023). In 2021, the annual inflation rate hovered around 2 percent. However, beginning in late 2021, prices of goods and services began to rapidly increase. The annual inflation rate averaged 6.5 percent in 2022, peaking at 9.1 percent in June 2022 (DOL, BLS, 2024).

Except where specifically noted, the averages in this report are national averages, weighted by each State agency's average monthly caseload of infants receiving formula through WIC in fiscal year 2022 (see box, "National Averages").

[19] An estimated 98.4 percent of WIC prescriptions for infant formula in 2018 allowed powdered formula, while concentrate and ready-to-feed forms were permitted in 22.1 and 8.3 percent of infant prescriptions, respectively (Kline et al., 2020). Because prescriptions were not mutually exclusive, the percentages add up to more than 100 percent.

[20] WIC infant formula issuances vary by infant age. As an example, a 0- to 3-month-old fully formula fed infant is allowed 806 reconstituted ounces per month. WIC would issue this infant 36 cans of 12.4 ounce powdered infant formula for a 4-month period. See the WIC Infant Formula Calculator for more examples (USDA, N.D.).

National Averages

Drawing conclusions about the research questions posed in this report at a national level required an average across States that considered the fact that different State WIC agencies purchased different amounts of formula. Unless otherwise specified, the averages in this report were weighted by the average monthly caseload of infants receiving formula through WIC in each State agency or multi-State alliance in fiscal year 2022 (see table E1 in appendix E).

The caseload totals for multi-State alliances included all infants receiving formula through WIC in each State, territory, and Indian Tribal Organization included in that respective alliance. Under current WIC regulations, the maximum monthly allowance of formula for partially breastfed infants is about half of the maximum monthly allowance for fully formula fed infants (USDA, Food and Nutrition Service (FNS), n.d.). To account for the smaller amounts of formula that partially breastfed infants receive, State weights were calculated as the sum of the number of fully formula fed infants and half the number of partially breastfed infants. If one State has an average monthly caseload of infants receiving formula through WIC (adjusted by breastfeeding status) that was twice as large as another State, that State received a weight that was twice that of the smaller State.

This approach assumed that there was no change in the distribution of caseloads across the WIC State agencies between fiscal year 2022 and the time when the States' previous infant formula contract became effective. Although this is unlikely to be the case, using caseload counts from a single year (2022) ensures that any change in the variable of interest (e.g., real net wholesale price) between previous and current contracts is due solely to changes in the values of the variable and not to changes in the numbers of infants participating in WIC across States over time.

Results

How Have Net Wholesale Price Bids Changed in Recent Years?

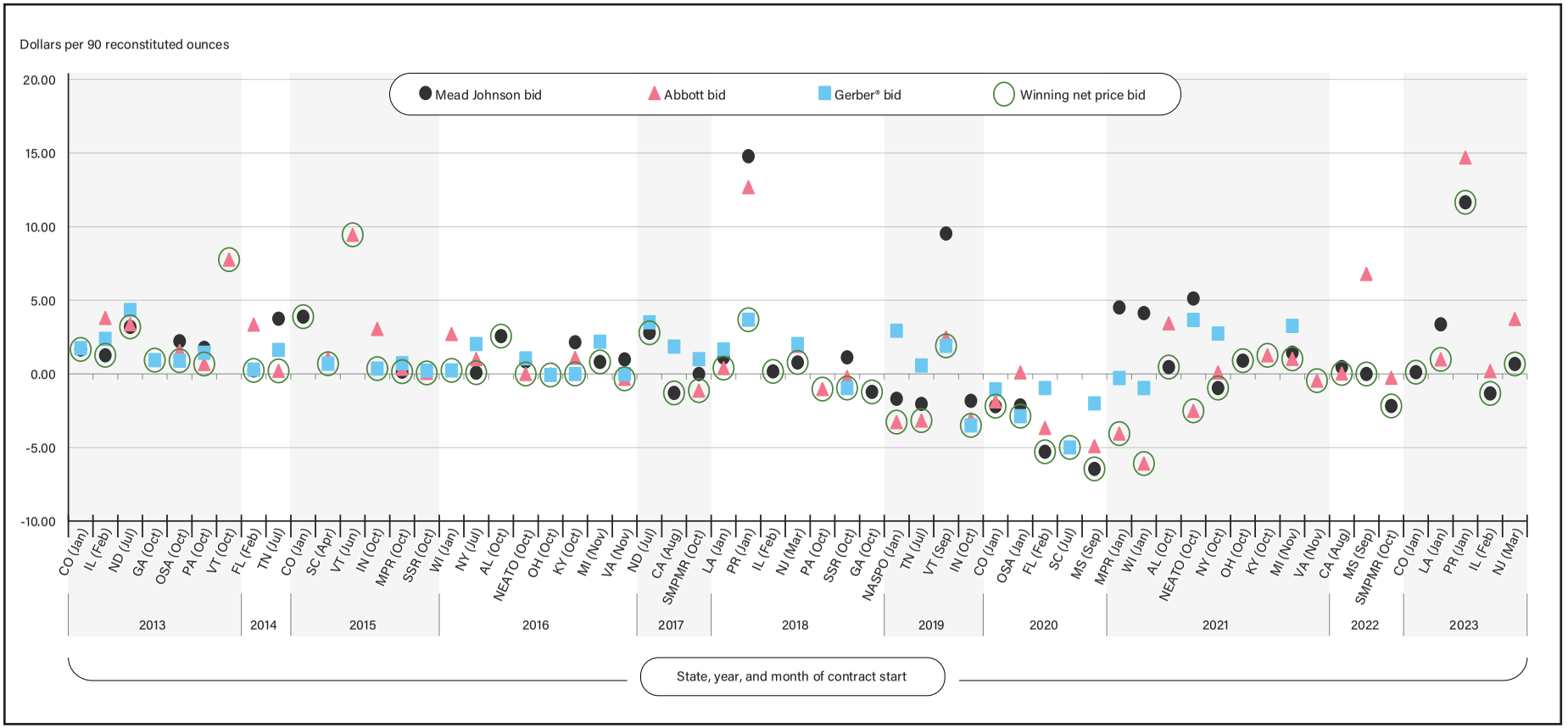
State agencies award single-source contracts to the bidder offering the lowest total net wholesale price. Figure 2 shows real net wholesale price bids by the State/alliance awarding the contract and by the manufacturer from January 2013 through March 2023.[21] Along with figure 2, table 1 reports numbers and shares of negative bids, as well as the weighted-average bid for each year.

On average, net wholesale price bids decreased between 2013 ($1.71) and 2020 (–$3.34). Beginning in 2018 and through 2020, the average net wholesale price bid was negative, indicating that, on average, rebate amounts exceeded wholesale prices. The first zero dollar and negative winning bids occurred in October 2016 (figure 2; table 1). The number of zero dollar and negative bids peaked in 2020 at 12 bids across 5 contracts that covered about 12 percent of WIC infants. In 2021, there were seven negative bids across nine contracts that covered about 25 percent of WIC infants. In 2022, three of six bids were negative, and for the contracts observed through March of 2023, only one of the bids was negative.

[21] Mississippi, Vermont, and Puerto Rico were included in the current analyses but were not included in the analyses conducted by Oliveira and Davis (2015). Puerto Rico uses a retail delivery system and has participated in competitive bidding since the 1990s, but Puerto Rico is unique in that it is an island and U.S. territory with a different supply chain and market structure relative to U.S. States. During the periods covered in prior reports, Vermont and Mississippi used home delivery and direct distribution systems, respectively. The analyses presented here included the first bids following the transitions to retail delivery systems in both States.

Figure 2

Real net wholesale price bids by manufacturer and State agency, January 2013–March 2023



WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. OSA = Oklahoma State Alliance (Oklahoma; Chickasaw Nation; Citizen Potawatomi Nation; Eight Northern Indian Pueblos, Incorporated; Mississippi Band of Choctaw Indians; Muscogee (Creek) Nation; Otoe-Missouria Tribe; and WCD Enterprises, Incorporated). MPR = Mountain Plains Region (Missouri, Nebraska, South Dakota, and North Dakota (beginning 10/1/2021)). SSR=Southwest/Southeast Regions (Arkansas, New Mexico, and North Carolina). NEATO = New England and Tribal Organization (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont (as of 10/1/2021), and Cherokee Nation of Oklahoma). SMPMR = Southwest/Mountain Plains/Midwest Regions (Iowa, Minnesota, Texas, and the Choctaw Nation of Oklahoma). NASPO = National Association of State Procurement Officials (Alaska; Arizona; Delaware; Hawaii; Idaho; Kansas; Maryland; Montana; Nevada; Oregon; Utah; Washington; Washington, DC; West Virginia; Wyoming; American Samoa; Guam; the Virgin Islands; the Commonwealth of the Northern Mariana Islands; Inter-Tribal Council of Arizona; Inter-Tribal Council of Nevada; Navajo Nation; Osage Nation; and Pueblo of Isleta).

Note: Winning and losing net price bids for each contract are shown, starting in January 2013 through March 2023, for 90 reconstituted ounces of milk-based powder formula. Net wholesale price is the amount of the wholesale price paid by WIC after the manufacturer rebate is applied. Prices were adjusted to 2023 dollars by the U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Items for Urban Consumers. In 2015, Vermont began transitioning from a home delivery system to a retail system. Abbott was the only bidder for the Vermont infant formula contract in 2015, and the real net price bid was $9.45. Vermont joined the New England and Tribal Organization (NEATO) alliance in 2021. In 2020, Mississippi began transitioning from a direct distribution system to a retail system. All three manufacturers bid for the Mississippi infant formula contract in 2021. Mead Johnson won the auction with a real net price bid of –$6.46.

Source: USDA, Economic Research Service based on data from USDA, Food and Nutrition Service.

Table 1

Total bids, negative bids, average net wholesale price bid, and share of infant participants covered under new contracts by year, 2013–23

Year	New contracts	Total bids	Zero dollar and negative bids	Percent of bids that were negative	Annual average net wholesale price bid (U.S. dollars)	WIC infants in new contracts	Total WIC infants	Percent of WIC infants covered by new contracts
2013	7	16	0	0.0	1.71	253,388	1,960,102	12.9
2014	2	6	0	0.0	1.25	181,104	1,910,281	9.5
2015	6	11	0	0.0	0.98	242,009	1,881,084	12.9
2016	8	19	6	31.6	0.95	405,795	1,810,132	22.4
2017	3	7	3	42.9	0.14	465,376	1,728,894	26.9
2018	7	15	4	26.7	–0.09	318,752	1,653,070	19.3
2019	4	12	7	58.3	–1.04	255,581	1,557,041	16.4
2020	5	13	12	92.3	–3.34	187,450	1,504,321	12.5
2021	9	20	7	35.0	0.93	348,236	1,408,694	24.7
2022	3	6	3	50.0	–0.37	409,885	1,404,605	29.2
2023	5	9	1	11.1	0.92	121,379	1,437,121	8.4

WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

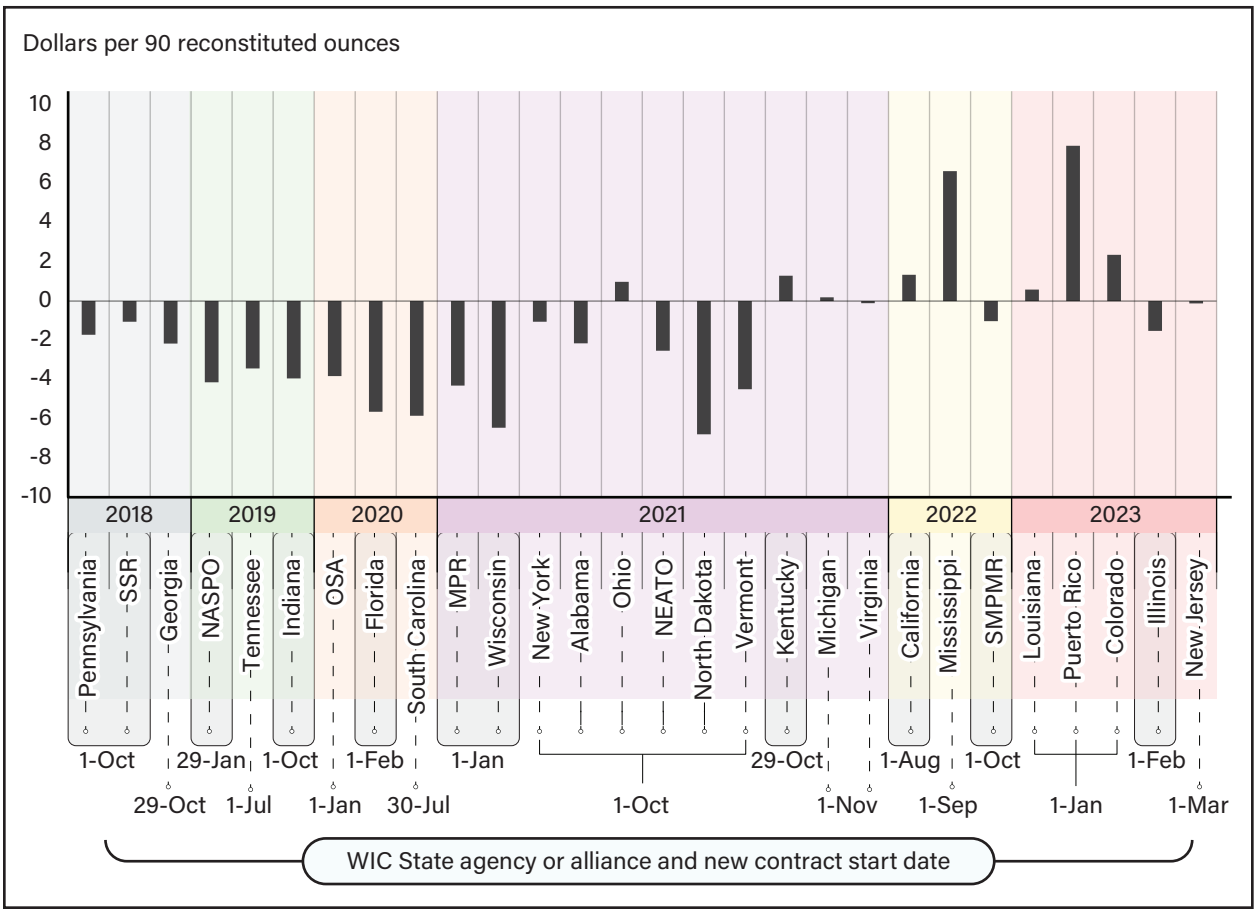
Note: Annual average net wholesale price bid is weighted by the number of WIC participants in States issuing new contracts in each year. Prices were adjusted to 2023 dollars by the U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Items for Urban Consumers. WIC infants in new contracts and total WIC infants are calendar year averages based on monthly participation data that included all 50 States and Washington, DC. The 2023 numbers are through March 2023.

Source: USDA, Economic Research Service based on data from USDA, Food and Nutrition Service.

The declines in winning net wholesale prices mean that most WIC State agencies were paying less of the wholesale price per unit of infant formula under contracts in place in March 2023 than under previous ones. Compared with previous contracts, the real net wholesale price per 90 reconstituted ounces of formula was lower in 20 of the 28 contracts effective in March 2023 (figure 3). These contracts represented 44 of 52 WIC State agencies.

Figure 3

Changes in real net wholesale prices between contracts in effect in March 2023 and previous contracts by State agency or alliance and new contract start date



WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. SSR=Southwest/Southeast Regions (Arkansas, New Mexico, and North Carolina). NASPO = National Association of State Procurement Officials (Alaska; Arizona; Delaware, Hawaii; Idaho; Kansas; Maryland; Montana; Nevada; Oregon; Utah; Washington; Washington, DC; West Virginia; Wyoming; American Samoa; Guam; the Virgin Islands; the Commonwealth of the Northern Mariana Islands; Inter-Tribal Council of Arizona; Inter-Tribal Council of Nevada; Navajo Nation; Osage Nation; and Pueblo of Isleta). OSA = Oklahoma State Alliance (Oklahoma; Chickasaw Nation; Citizen Potawatomi Nation; Eight Northern Indian Pueblos, Incorporated; Mississippi Band of Choctaw Indians; Muscogee (Creek) Nation; Otoe-Missouria Tribe; and WCD Enterprises, Incorporated). MPR = Mountain Plains Region (Missouri, Nebraska, South Dakota, and North Dakota (beginning 10/1/2021)). NEATO = New England and Tribal Organization (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont (as of 10/1/2021), and Cherokee Nation of Oklahoma). SMPMR = Southwest/Mountain Plains/Midwest Regions (Iowa, Minnesota, Texas, and the Choctaw Nation of Oklahoma).

Note: Current contracts were in effect in March 2023. 90 reconstituted ounces of milk-based powder infant formula. Prices were adjusted to 2023 dollars by the U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Items for Urban Consumers.

Source: USDA, Economic Research Service based on data from USDA, Food and Nutrition Service.

Table 2 shows the changes in wholesale prices, rebates, and net wholesale prices between current and prior contracts using a national average based on the number of formula-fed infants in each State in fiscal year 2022 (see box "National Averages"). On average, real net wholesale prices decreased by $1.49 per 90 fluid ounces of reconstituted formula between States' current and previous contracts (table 2).[22] As a result of lower winning net price bids, estimated inflation-adjusted annual costs to WIC on the wholesale price of infant

[22] In nominal terms (i.e., without adjusting for inflation), the national average net wholesale price decreased by $1.28.

formula were $130.81 million less under new contracts (see appendix E, "Estimating the impact of changes in real net wholesale prices on WIC infant formula costs").[23]

Table 2
Change in the national average wholesale price, rebate amount, and net wholesale price per unit of infant formula between contracts in effect in March 2023 and previous contracts

	Nominal values	Inflation adjusted values
		(real 2023 dollars)
Wholesale price	$0.87	–$1.23
Rebate	$2.15	$0.26
Net wholesale price	–$1.28	–$1.49

Unit = 90 reconstituted ounces of primary contract milk-based powder formula. N = 28 contract changes (56 contracts).

Note: Inflation adjusted prices were adjusted to 2023 dollars by the U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Items for Urban Consumers.

Source: USDA, Economic Research Service based on USDA, Food and Nutrition Service data.

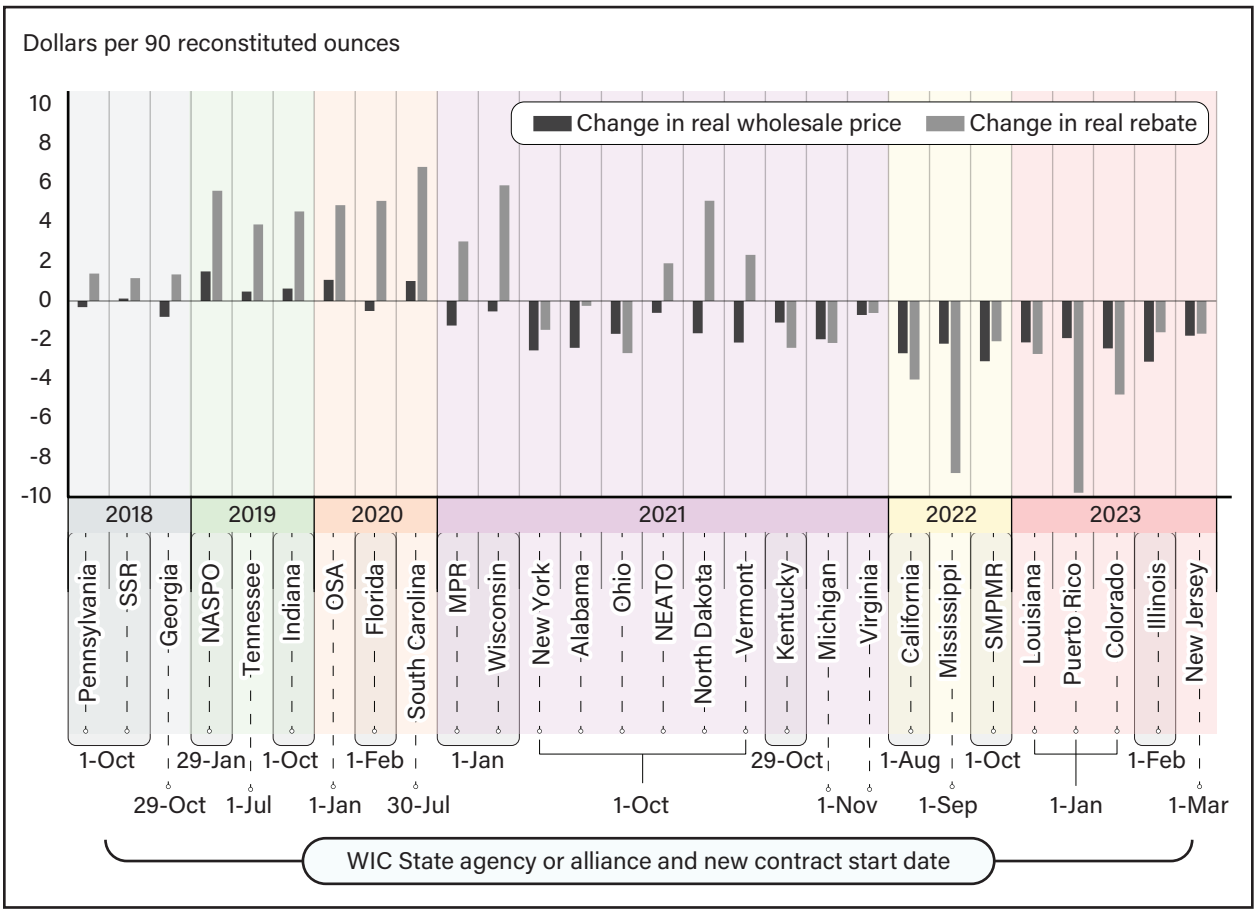
How Have Wholesale Prices and Rebates Contributed to Winning Net Wholesale Price Bids?

Real wholesale prices decreased between the previous contract and the current contract for 22 of the 28 contracts or 30 of 52 States (figure 4), resulting in a national average decrease of $1.23 per 90 reconstituted ounces between contracts (table 2). This decrease is in part because wholesale prices have not kept pace with inflation in recent years (see box "Wholesale Prices by Manufacturer, 2005 to 2023"). This decrease is a departure from previous periods in which average real wholesale prices have typically increased. For example, comparing contracts in effect in December 2008 to their previous contracts, real wholesale prices increased by 5 percent on average (Oliveira et al., 2010).

[23] In nominal terms (i.e., without adjusting for inflation), estimated annual costs to WIC on the wholesale price of infant formula were $111.5 million less under current contracts.

Figure 4

Changes in real wholesale prices and rebates between contracts in effect in March 2023 and previous contracts by State agency or alliance and new contract start date



WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. SSR=Southwest/Southeast Regions (Arkansas, New Mexico, and North Carolina). NASPO = National Association of State Procurement Officials (Alaska; Arizona; Delaware, Hawaii; Idaho; Kansas; Maryland; Montana; Nevada; Oregon; Utah; Washington; Washington, DC; West Virginia; Wyoming; American Samoa; Guam; the Virgin Islands; the Commonwealth of the Northern Mariana Islands; Inter-Tribal Council of Arizona; Inter-Tribal Council of Nevada; Navajo Nation; Osage Nation; and Pueblo of Isleta). OSA = Oklahoma State Alliance (Oklahoma; Chickasaw Nation; Citizen Potawatomi Nation; Eight Northern Indian Pueblos, Incorporated; Mississippi Band of Choctaw Indians; Muscogee (Creek) Nation; Otoe-Missouria Tribe; and WCD Enterprises, Incorporated). MPR = Mountain Plains Region (Missouri, Nebraska, South Dakota, and North Dakota (beginning 10/1/2021)). NEATO = New England and Tribal Organization (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont (as of 10/1/2021), and Cherokee Nation of Oklahoma). SMPMR = Southwest/Mountain Plains/Midwest Regions (Iowa, Minnesota, Texas, and the Choctaw Nation of Oklahoma).

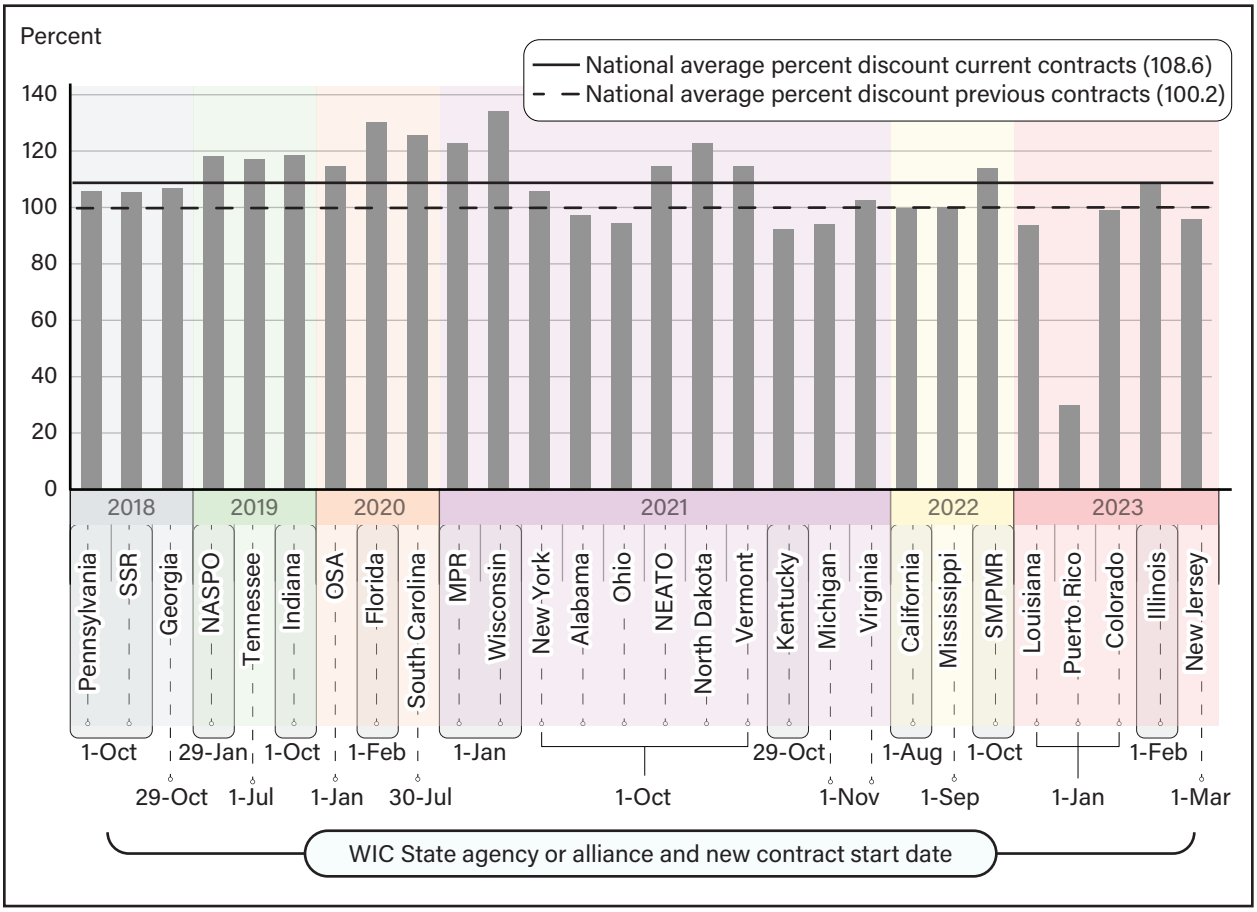
Note: Current contracts were in effect in March 2023. Prices were adjusted to 2023 dollars by the U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Items for Urban Consumers.

Source: USDA, Economic Research Service based on data from USDA, Food and Nutrition Service.

Although wholesale prices decreased in real terms, rebates (in dollars and as a share of wholesale prices) increased. Real rebates increased from the previous contract for 14 of the 28 contracts in effect in March 2023, representing 36 of 52 States (figure 4). These increases resulted in a national average increase in rebate amounts of $0.26 per 90 reconstituted ounces from previous contracts (table 2).

In terms of rebates as a percentage of the wholesale price, 42 States received rebates of more than 100 percent, and 7 States received discounts of greater than 120 percent as of March 2023 (figure 5). The National Association of State Procurement Officials (NASPO), which consists of 15 States, received a percentage discount of 118 percent. Wisconsin received a discount of 134 percent, the largest percent discount of all States.

Figure 5
Percent discounts for contracts in effect in March 2023



WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. SSR=Southwest/Southeast Regions (Arkansas, New Mexico, and North Carolina). NASPO = National Association of State Procurement Officials (Alaska; Arizona; Delaware, Hawaii; Idaho; Kansas; Maryland; Montana; Nevada; Oregon; Utah; Washington; Washington, DC; West Virginia; Wyoming; American Samoa; Guam; the Virgin Islands; the Commonwealth of the Northern Mariana Islands; Inter-Tribal Council of Arizona; Inter-Tribal Council of Nevada; Navajo Nation; Osage Nation; and Pueblo of Isleta). OSA = Oklahoma State Alliance (Oklahoma; Chickasaw Nation; Citizen Potawatomi Nation; Eight Northern Indian Pueblos, Incorporated; Mississippi Band of Choctaw Indians; Muscogee (Creek) Nation; Otoe-Missouria Tribe; and WCD Enterprises, Incorporated). MPR = Mountain Plains Region (Missouri; Nebraska; South Dakota; and North Dakota (beginning 10/1/2021)). NEATO = New England and Tribal Organization (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont (as of 10/1/2021), and Cherokee Nation of Oklahoma). SMPMR = Southwest/Mountain Plains/Midwest Regions (Iowa, Minnesota, Texas, and the Choctaw Nation of Oklahoma).

Note: The national average percent discount for previous contracts was 100.2 percent. The national average percent discount for current contracts was 108.6 percent.

Source: USDA, Economic Research Service based on data from USDA, Food and Nutrition Service.

Expressing rebates in terms of percent discounts helps when comparing current contracts to previous contracts because percent discount controls for changes in wholesale prices over time. As of March 2023, WIC State agencies were receiving a larger discount on formula than before and exceeding the manufacturers' prices for their formula, on average. The national average percent discount in the 28 current contracts was 108.6 percent (figure 5).[24] The national average percent discount in the previous contracts was 100.2 percent.

Our examination of the factors determining real net wholesale price indicates that changes in real wholesale prices and real rebates have contributed to the decrease in real net wholesale prices between current and previous

[24] We used the percentage discount to calculate the amount of the rebate for the primary contract infant formula, as well as for all the other contract formulas produced by the manufacturer awarded the contract and approved for issuance by the WIC State agency. The unweighted average percent discount was 98.8 percent in the previous contract and 106.4 percent in the current contract.

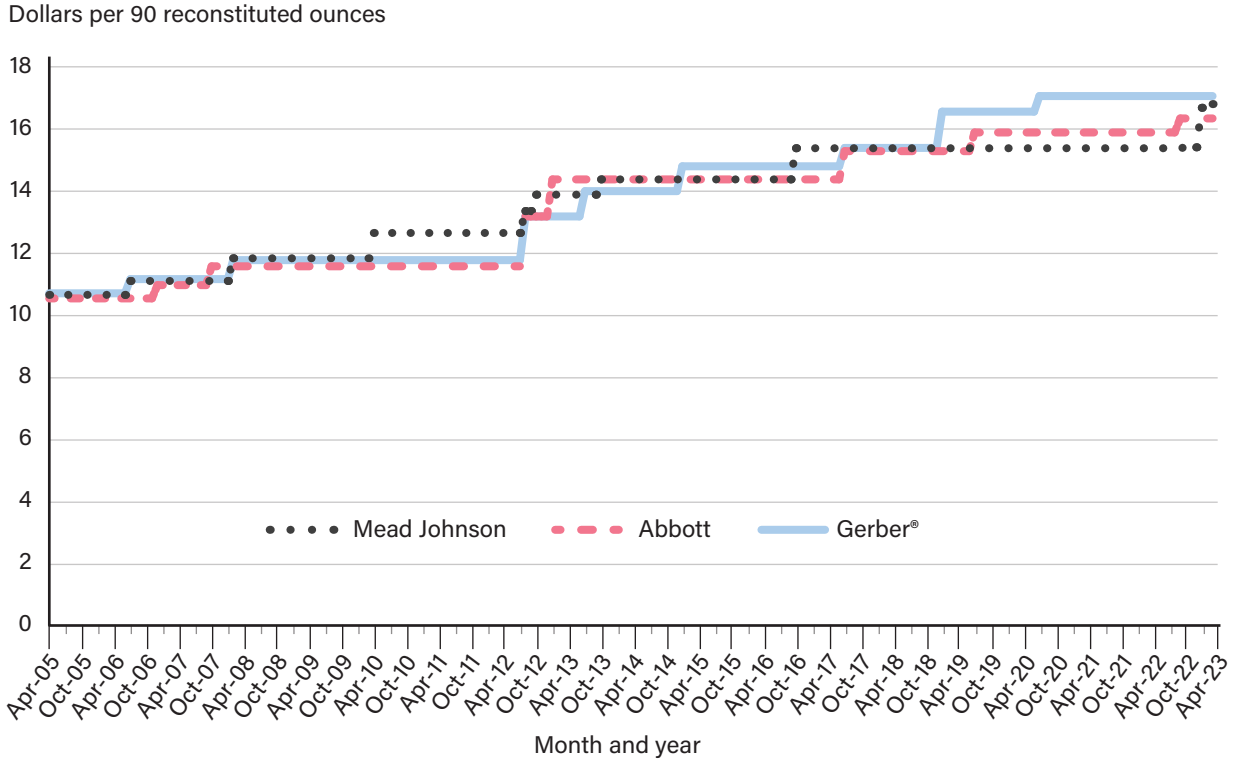
contracts. Combined, the national average decrease in the real wholesale prices (–$1.23 per 90 reconstituted ounces) and the national average increase in the real rebate ($0.26 per 90 reconstituted ounces) resulted in a national average decrease in the real net wholesale price (–$1.49 per 90 reconstituted ounces) (table 2).[25]

Wholesale Prices by Manufacturer, 2005 to 2023

The decline in real wholesale prices between current and prior contracts indicates that increases in nominal wholesale prices over time have not kept pace with inflation. We considered this finding in more detail by comparing trends in nominal and real wholesale prices from April 2005 through March 2023 (box figures 1 and 2).

Each manufacturer has raised the national wholesale price of their primary contract formula since April of 2005 (box figure 1). The step-like pattern resulted from using manufacturer bids on infant formula contracts to obtain wholesale prices. In the past, this information was obtained from manufacturers' national wholesale price lists, which were published biannually. These increases were not as evident or as large in real terms (box figure 2). In fact, it appears real wholesale prices in 2023 were comparable to real prices in 2005.

Box figure 1
Nominal wholesale prices by manufacturer, April 2005–March 2023



Note: A previous report (Oliveira & Davis, 2006) reported wholesale prices through 2005. This figure starts in April 2005 and goes to March 2023 to provide an update to that report.

Source: USDA, Economic Research Service based on data from USDA, Food and Nutrition Service.

Continued on next page ►

[25] Nominal wholesale prices (not adjusted for inflation) increased by an average of $0.87 from previous contracts. A total of 48 States experienced an increase in nominal wholesale price, 3 States experienced no change, and 1 State (Vermont) experienced a decrease. Nominal rebates increased by an average of $2.15 from prior contracts, and 43 of 52 WIC State agencies saw their nominal rebate increase more than the nominal wholesale price.

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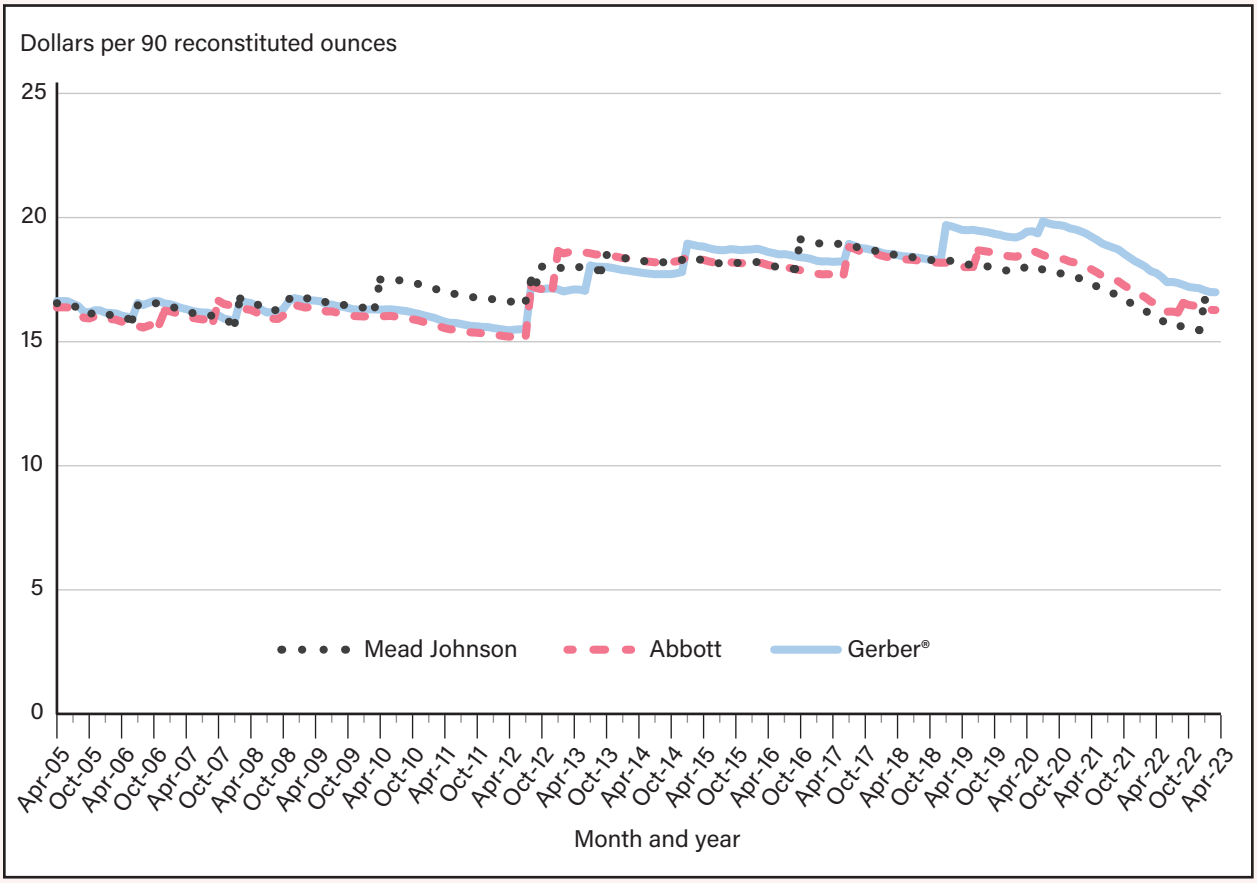
Wholesale Prices by Manufacturer, 2005 to 2023

Box figure 2
Real wholesale prices by manufacturer, April 2005–March 2023



Note: A previous report (Oliveira & Davis, 2006) reported wholesale prices through 2005. This figure starts in April 2005 and goes to March 2023 to provide an update to that report. Prices were adjusted to 2023 dollars by the U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Items for Urban Consumers. Wholesale prices observed in the data remain constant for several months in a row, whereas the inflation statistics (CPI-U) change monthly. If the nominal price of a good remains constant while inflation increases, then the real price of the good will decline.

Source: USDA, Economic Research Service based on data from USDA, Food and Nutrition Service.

How Much do Manufacturers' Net Wholesale Price Bids Differ Across Solicitations?

Even though manufacturers are offering the same product (i.e., primary contract infant formula), they do not have to bid the same for one solicitation as they do for another. A manufacturer's net wholesale price bid may differ depending on which State agency is awarding the contract and on how much value a manufacturer places on winning the contract.

Table 3 shows summary measures of the dispersion in real net wholesale prices within manufacturers for winning and losing bids made between January 2013 and March 2023. Puerto Rico is an outlier, so table 3 shows the dispersion measure including and excluding Puerto Rico. The effect of including Puerto Rico is apparent when examining the range (i.e., the difference between the minimum and maximum) of net wholesale price bids by each manufacturer. Including Puerto Rico, the range was $21.25 for Mead Johnson, $20.79 for Abbott, and $9.34 for Gerber®. Without Puerto Rico, the range decreased to $16.01 for Mead Johnson and $15.53 for Abbott, while Gerber® remained at $9.34.

The standard deviation divided by the mean is called the coefficient of variation and is a unitless measure of the dispersion of the data. The coefficient of variation ranged from 2.62 to 5.22 (excluding Puerto Rico) and from 2.42 to 3.50 (including Puerto Rico). The coefficients of variation indicate a sizeable amount of bid dispersion and suggest that manufacturers are strategic about their bids and value contracts for each WIC State agency differently.

Table 3
Measures of dispersion of real net wholesale price bids of infant formula manufacturers, January 2013–March 2023

	Manufacturer		
	Excluding Puerto Rico		
	Mead Johnson	Abbott	Gerber®
Maximum (U.S. dollars)	9.55	9.45	4.35
Minimum (U.S. dollars)	–6.46	–6.08	–4.99
Standard deviation (U.S. dollars)	2.67	3.03	1.93
Mean (U.S. dollars)	0.76	0.58	0.74
Coefficient of variation	3.54	5.22	2.62
Number of bids	45	45	39
	Including Puerto Rico		
	Mead Johnson	Abbott	Gerber®
Maximum (U.S. dollars)	14.79	14.71	4.35
Minimum (U.S. dollars)	–6.46	–6.08	–4.99
Standard deviation (U.S. dollars)	3.64	3.98	1.96
Mean (U.S. dollars)	1.29	1.14	0.81
Coefficient of variation	2.83	3.50	2.42
Number of bids	47	47	40

Note: Real net wholesale price after rebate for 90 reconstituted ounces of primary contract milk-based powder formula. Net wholesale price is the amount of the wholesale price paid by Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) after the manufacturer rebate is applied. Prices were adjusted to 2023 dollars by the U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Items for Urban Consumers. Means are unweighted. Total contracts without Puerto Rico=57; total contracts with Puerto Rico=59.

Source: USDA, Economic Research Service based on data from USDA, Food and Nutrition Service.

We also calculated correlations between net price bids of manufacturer pairs (i.e., Mead Johnson and Abbott, Mead Johnson and Gerber®, and Abbott and Gerber®) to see if manufacturers place similar valuations on contracts. The correlation coefficient measures the strength and direction of the linear relationship between two sets of observations. A value of 1 signifies a perfect positive relationship (i.e., as the values in one set of observations increase (decrease), the values in the other set of observations increase (decrease) to the same degree), and a value of 0 indicates no relationship. A negative value indicates an inverse relationship; in other words, as values in one set of observations increase, values in the other set decrease. We report correlations with and without bids for contracts with Puerto Rico. Excluding Puerto Rico allows for a comparison of correlations to the period covered in the previous report on this topic (Davis & Oliveira, 2015). We tested whether correlations between each set of manufacturers for each period were statistically significant from 0 or no relationship.[26]

[26] Davis and Oliveira (2015) did not report statistical significance, but we were able to replicate their results and report significance.

Excluding Puerto Rico, we calculated the correlations of net price bids from 2013 to 2023 between Mead Johnson and Abbott as 0.27, between Mead Johnson and Gerber® as 0.45, and between Abbot and Gerber® as 0.42 (table 4). The weak and not statistically significant correlation between bids for Mead Johnson and Abbott suggests that the two manufacturers valued most contracts differently. The moderate and statistically significant correlations between bids by Mead Johnson and Gerber® and by Abbott and Gerber® suggest more similar valuations of contracts.

Including Puerto Rico changed correlation coefficients on bids between Mead Johnson and Abbott from an insignificant 0.27 to a statistically significant 0.65 (table 4). This change suggests that Mead Johnson and Abbott valued most other contracts differently but valued contracts with Puerto Rico similarly. The moderate and statistically significant correlations between bids by Mead Johnson and Gerber® and bids by Abbott and Gerber® suggest similar valuations about half of the time.

When we compared to the 2003–13 study period, which did not include Puerto Rico, the correlations between bids by Mead Johnson and Abbott and by Mead Johnson and Gerber® were consistent across time (table 4). We calculated stronger correlations between Abbott and Gerber® in the current period than in the previous period (0.42 versus -0.07).

Table 4
Correlation of net wholesale price bids among infant formula manufacturers, 2003–13 and 2013–23

	Correlation coefficient		
	Excluding Puerto Rico		Including Puerto Rico
	2003–13	2013–23	2013–23
Mead Johnson and Abbott	0.20	0.65*	0.27
Mead Johnson and Gerber®	0.46*	0.49*	0.45*
Abbott and Gerber®	–0.07	0.49*	0.42*

*Indicates statistically different from 0 or no relationship at the 5-percent significance level.

Note: The correlation coefficient measures the strength and direction of the linear relationship between two sets of observations.

Source: USDA, Economic Research Service based on data from Davis, D.E., & Oliveira, V.J. (2015), *Manufacturers' bids for WIC infant formula rebate contracts*, 2003–13 (Report No. EIB-142), U.S. Department of Agriculture, Economic Research Service; and USDA, Food and Nutrition Service.

Bid dispersion within manufacturers across contracts and moderate correlation between manufacturer bids for a given contract ultimately illustrates that State agencies pay different net wholesale prices for the same products. As a result, cost-savings to WIC from infant formula contracts will differ across States.

Net wholesale price bids may differ depending on how much value manufacturers place on winning the contract, and several factors may influence manufacturers' valuations of contracts. In a prior report, Davis and Oliveira (2015) considered whether real net wholesale price bids were influenced by the number of WIC infants at the State agency level. They found that larger State agencies received lower net price bids and, as a result, lower winning net price bids. In the current report, we considered whether real net wholesale price bids were influenced by the share of infants participating in WIC at the State agency level.

Why Might Manufacturers Submit Negative Net Price Bids or Offer Rebates That Exceed Wholesale Prices?

The distribution of WIC and non-WIC consumers in the infant formula market likely explains why infant formula manufacturers are willing to submit negative net price bids. There is evidence that a manufacturer that wins the WIC contract in a State realizes spillover effects (i.e., increased market shares) in the non-WIC

market (Choi et al., 2020; Davis, 2011; Oliveira et al., 2011; Rojas & Wei, 2019). For example, retailers generally devote more shelf space and better product placement to the WIC contract formulas. This placement can result in greater product visibility, which, in turn, may spur sales to non-WIC consumers. Spillover effects are important to the formula manufacturers since, unlike formula purchased through WIC, manufacturers do not pay a rebate on formula that is purchased outside the program.[27] See Oliveira et al. (2011) for a more detailed discussion of other possible means by which formula manufacturers may realize spillover effects from winning the WIC contract.

When there is a sizeable spillover effect, manufacturers may offer lower net prices to win a WIC rebate contract. The WIC market may be minimally or negatively profitable in this scenario, but the smaller the WIC market is relative to the more profitable non-WIC market, the more willing the manufacturer is to offer lower net prices to WIC.

A simple example demonstrates this concept.[28] Suppose, for simplicity, the wholesale price of infant formula is $5.00 and costs $1.00 to produce and market. Assume there are 100 infants in a State, and a parent of each infant buys one unit of infant formula. Assume that 70 of the 100 infants receive WIC (i.e., WIC infants comprise 70 percent of the total market). Assume that manufacturers offer a rebate of $2.00 for a net wholesale price of $3.00. In this scenario, the total profit to the manufacturer would be (5-1-2)*70 + (5-1)*30 = 260. Now assume instead that 20 of the 100 infants received WIC so that WIC infants comprise 20 percent of the market and the manufacturer offers a rebate of $6.00 for a net wholesale price of –$1.00. The profit to the manufacturer is now (5-1-6)*20+(5-1)*80 = 280.

The scenario assumes a 100-percent spillover effect. Once the manufacturer wins the WIC contract, it sells to all infant formula consumers, regardless of WIC participation. In reality, previous research has found that a contract holder's market share is about 84 percent (Oliveira et al., 2011).[29] Note that in the hypothetical scenario, the manufacturer is just as profitable offering a larger rebate and negative net wholesale price when the non-WIC consumers are a large share of all infant formula consumers. The reason is that the lower-profit market segment has decreased in size, whereas the higher-profit segment has increased in size. In this example, the manufacturer can "afford" to offer a very large rebate and lose money in the WIC segment, ultimately offering a negative net price. The purpose is to show a scenario in which the "cost" to the manufacturer of accessing the profitable non-WIC market decreases as the size of the WIC market decreases, allowing for a lower and even negative net wholesale price.[30]

To the extent that the share of WIC and non-WIC infants in a given infant formula market plays a role in manufacturers' decisions to submit negative net price bids, then we would expect net wholesale price bids to decrease, on average, as the share of U.S. infants participating in WIC decreases.

Figure 6 shows the average real net wholesale price bid on winning contracts in 2023 dollars (left y-axis) and WIC infants as a share of U.S. births (right y-axis) for 2003–22. Consistent with our expectation, both WIC infants as a share of births and real net wholesale prices on winning bids, on average, have been falling. Strong economic growth likely decreased the share of infants who were income eligible for the program (Hodges et al., 2024).

[27] For example, if the percentage discount of a contract is 92 percent, the wholesale price that the manufacturer receives for a container of non-rebated formula is more than 12 times greater than the net price received for a container sold to a WIC participant.

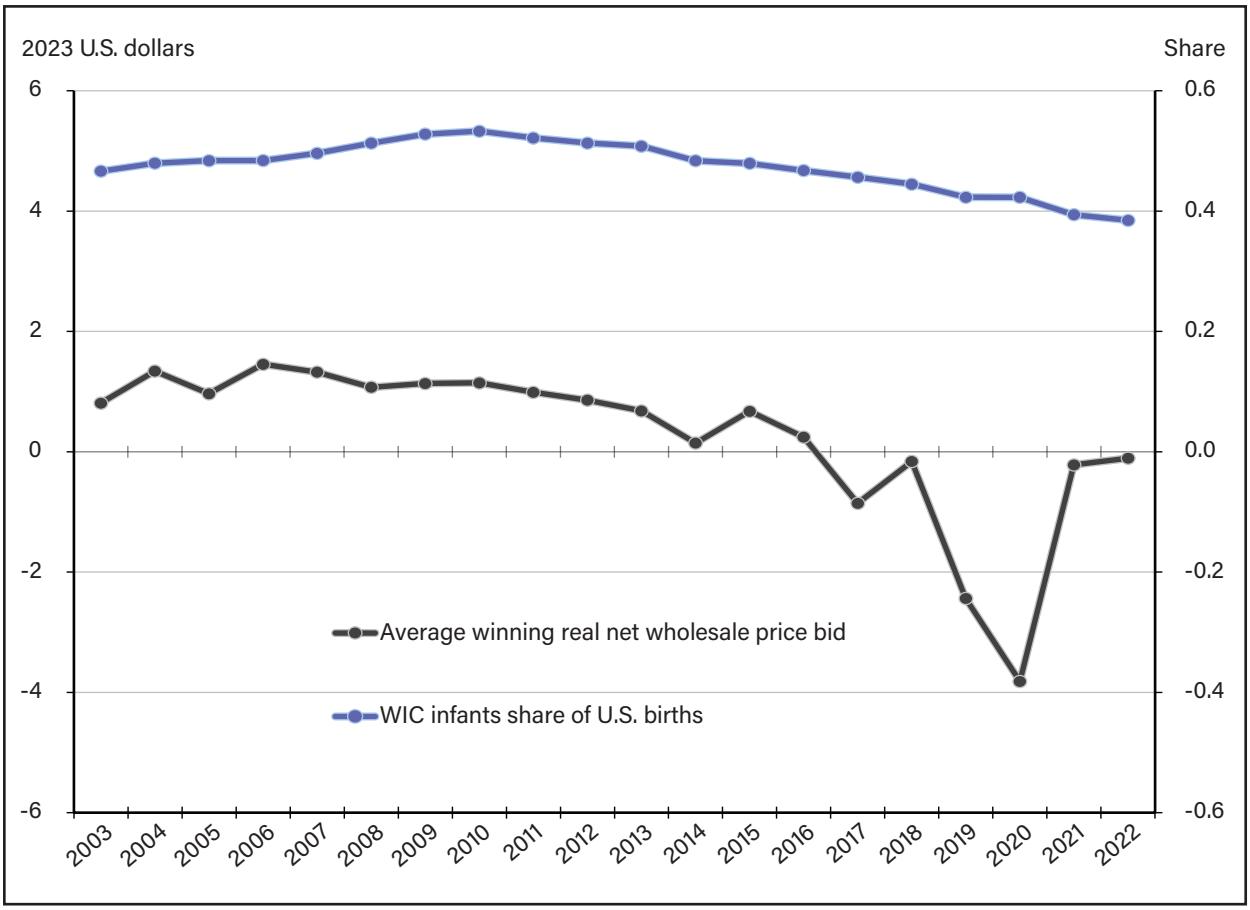
[28] For a complete theoretical model of rebate bids and wholesale prices, see Davis (2011).

[29] Rojas and Wei (2019) further broke this down into market share by WIC and non-WIC brand formula and toddler milk products, finding that market shares of the contract holder in the period prior to a contract change (i.e., when the contract holder has been established in the market for several years) are 94 percent for WIC infant formulas, 65 percent for non-WIC infant formulas, and 57 percent for toddler milks.

[30] Rojas and Wei (2019) estimated profits for the new contract holder following a contract change based on sales revenues and existing assumptions about retail markup relative to retail price. They found that manufacturer profits from sales to non-WIC consumers made up for losses on infant formula sold to WIC consumers.

Figure 6

Annual average real net wholesale price bids on new contracts and WIC infants, as a share of U.S. births, 2003–22



WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

Note: Net prices are annual averages for new contracts (i.e., winning bids) that began during a given year. Thus, the numbers and identities of State agencies included in the average vary from year to year. The year 2022 was the most recent year with complete data at the time that the analysis was conducted. Prices were adjusted to 2023 dollars by the U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Items for Urban Consumers. In 2015, Vermont began transitioning from a home delivery system to a retail system. Abbott was the only bidder for the Vermont infant formula contract in 2015, and the real net-price bid was $9.45. In 2020, Mississippi began transitioning from a direct distribution system to a retail system. All three manufacturers bid for the Mississippi infant formula contract in 2021. Mead Johnson won the auction with a real net-price bid of –$6.46.

Source: USDA, Economic Research Service using data from USDA, Food and Nutrition Service and U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

We conducted a linear regression analysis to estimate the relationship at the WIC State/alliance level[31] using the following equation,

$$Net\ price_{i,t} = \alpha + \delta_i + \beta WIC\ share_{i,t}$$

The net wholesale price is the dependent variable and is the real (i.e., inflation adjusted) net wholesale price received by State agency/alliance i in year t. *WIC share* is the independent variable and is the total number of WIC participating infants in a State agency/alliance in a year, divided by the total number of births in the

[31] Regression analysis quantifies relationships between variables. A linear regression analysis is a statistical method that estimates an equation that assumes there is a linear relationship between variables.

State agency/alliance in the same year.[32] α is the y-axis intercept and β is the slope coefficient. The δ_i are State agency/alliance fixed-effect parameters. These parameters are included to shift the y-axis intercept for each State agency/alliance and account for State agency/alliance specific factors that affect the net wholesale price and are constant through time.

The model provided the following estimates for the main parameters of interest:[33]

$$Net\ wholesale\ price = -5.43^{**} + 0.114^{***}\ WIC\ share$$
$$(2.1) \qquad (0.040$$

The positive slope coefficient on *WIC share* suggests a positive correlation between net wholesale price and WIC share. On average, the net wholesale price declines by $1.14 when WIC share declines by 10 percentage points, all else constant.

A useful aspect of regression analysis is that it can predict levels for the dependent variable for different values of the independent variable. Table 5 shows the predicted net wholesale price for different values of WIC share. Note that the regression equation predicts a negative net wholesale price when the WIC share is at or below 40 percent. Nationally, about 40 percent of all infants in the United States participate in WIC (Hodges et al., 2024; Kessler et al., 2023) (figure 6).

Table 5
Real net wholesale prices predicted by regression equation

WIC share (percent)	Predicted net wholesale price	Standard error	95-percent confidence interval	
	(2023 dollars)			
80	4.31	1.35	1.56	7.06
70	3.17	0.95	1.24	5.10
60	2.03	0.55	0.92	3.15
50	0.89	0.15	0.60	1.19
40	–0.25	0.25	–0.76	0.27
30	–1.39	0.65	–2.72	–0.05
20	–2.52	1.06	–4.68	–0.37

Note: The winning net price regression used contracts from 1998 through 2022 and included 138 observations. Predicted real net prices were calculated for all 138 observations at the given level of WIC share, then averaged. Predicted net price includes State fixed-effect estimates. Net wholesale prices were adjusted to 2023 dollars by the U.S. Department of Labor, Bureau of Labor Statistics' Consumer Price Index for All Items for Urban Consumers.

Source: USDA, Economic Research Service calculations based on data on WIC infant participants from USDA, Food and Nutrition Service; and data from U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

[32] The ratio of WIC participating infants (divided by births) is multiplied by 100 to get a percentage. In additional analysis, we considered whether the relationship between WIC share and net price bid was nonlinear. Empirically, there was not enough variation in WIC share to precisely estimate discrete parameters (dummy variables) or quadratic terms. When including a quadradic term, neither the coefficient for the linear nor quadratic term was statistically significant. A joint test found them jointly statistically significant, but estimated net price predictions from the parameters were not realistic.

[33] The figures in parentheses are standard errors clustered by alliance. The asterisks (*** and **) indicate estimates are statistically significant at the 1-percent level and 5-percent level, respectively. The R-squared for this regression is 0.4369. We do not present the fixed-effect parameter estimates for simplicity. In additional analysis of variance (ANOVA), the time and alliance fixed effects were not statistically significant.

Another possible motivation for low net wholesale price bids is that formula manufacturers may want to win the WIC contract to maintain sales volume (or minimize their loss of sales volume) in the face of a shrinking market for infant formula. Total births have been declining in the United States since 2008 but very recently have begun to level off (Hodges et al., 2024).

Infant formula manufacturers have large, capital-intensive plants that may exhibit large, fixed costs in the short run and economies of scale (over a wide range of production) in the long run. A decrease in formula sales could impact a manufacturer's ability to operate at optimal capacity. Operating existing plants at less than their optimal level can result in higher per-unit costs of production. Finally, marketing costs may be lower when holding a WIC contract. Given a large spillover effect, holding the WIC contract may result in lower advertising, couponing, and discounting for manufacturers. An et al. (2023) found a significant reduction in costs to formula manufacturers associated with holding the WIC contract.

Finally, the wholesale prices charged to retailers by the formula manufacturers vary by volume, with larger volume purchases (e.g., up to a truckload of formula) receiving a bulk discount. The net wholesale price paid by WIC is the difference between the rebate level offered by the manufacturer and the infant formula manufacturer's wholesale price per unit for a full truckload of infant formula at the time of the bid. To the degree that smaller retailers purchase their WIC formula in less than full truckload volumes, the manufacturer receives higher wholesale prices, which may exceed the rebate amount. The share of formula purchased through WIC that is purchased in volumes of less than a full truckload (thus receiving higher wholesale prices) is unknown. In this report, we focused on the wholesale cost of infant formula to WIC. However, we note that wholesale cost may impact the retail price of infant formula and, thus, the total cost of infant formula to WIC.

Discussion

Competition in the Bidding Process

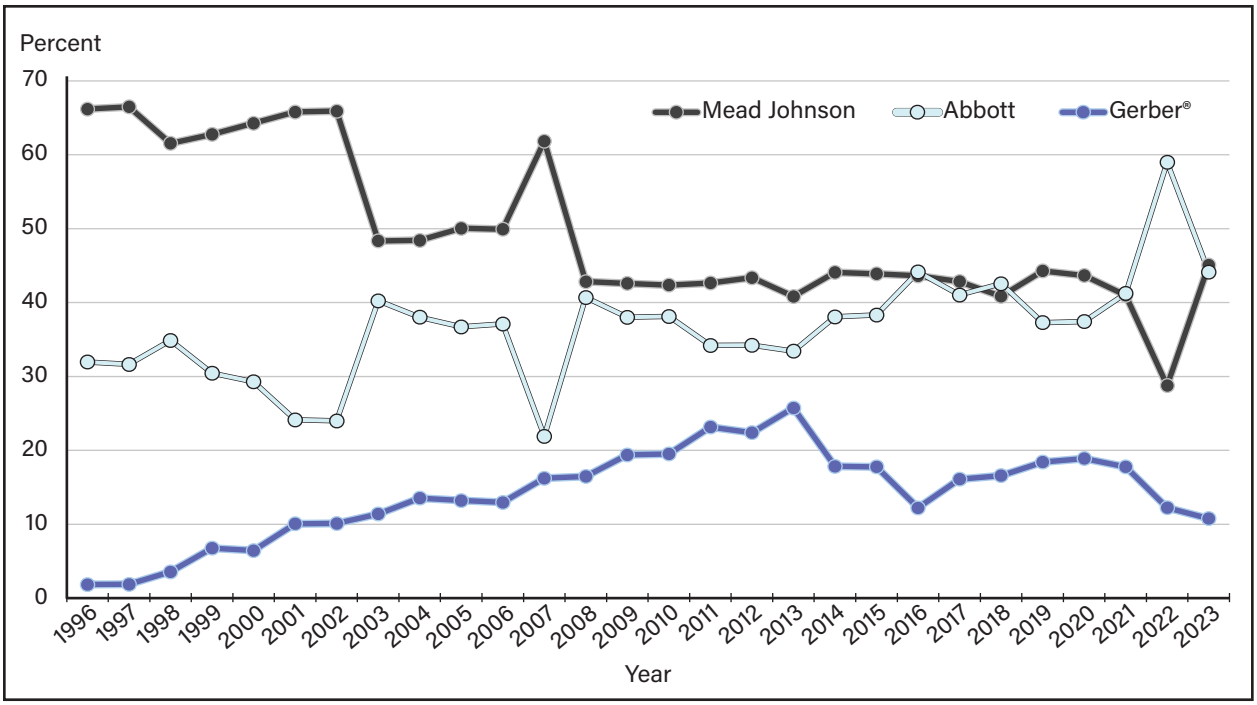
We observed a fair amount of turnover in contracts, with roughly 40 percent of new contracts awarded to a different manufacturer (appendix D). Despite this turnover, the shares of WIC infants covered by contracts with each manufacturer remained relatively stable over time (figure 7). Future research could apply economic theory, particularly theory based on oligopoly, to investigate the extent to which the manufacturers strategize to win certain contracts and ultimately maximize profits.

Along these lines, we found evidence that manufacturers valued some contracts differently than others and adjusted their bids accordingly. When considering winning and losing bids placed by manufacturers between 2013 and 2023, differences between minimum and maximum bids ranged from $9.34 to $16.01 per 90 reconstituted fluid ounces. At the same time, moderate correlations between bids suggest that manufacturers placed similar value on some contracts. Manufacturers may bid similarly when they do not stand to gain much from the non-WIC market (e.g., Puerto Rico) and when gains for the non-WIC market are more lucrative (e.g., Mississippi). In the case of Mississippi, all three manufacturers offered negative net price bids for the first contract following the State agency's transition from direct distribution to retail distribution. Under a retail distribution system, retail shelf space for non-WIC brands would be more limited than under a direct distribution system, making access to the non-WIC market more competitive and holding the WIC contract more lucrative. Future research could further examine the strategic behavior of manufacturers by examining the

differences in bids between the contract winner and the runner up as a function of which manufacturers bid in the auction, the size of the contract, the size of the non-WIC market, the incumbent contract holder, and manufacturer capacity (i.e., the manufacturer's share of WIC-participating infants at the time of the solicitation).

In terms of effects on the infant formula market, although national-level concentration in the production and sales of infant formula preceded WIC's rebate system (Hodges et al., 2024; FDA, 2023), the rebate system may still create challenges for new manufacturers entering the U.S. infant formula market. Because WIC contracts require considerable scale to service, smaller manufacturers are at a disadvantage in the current WIC rebate contract auction system (Davis, 2011; An et al., 2023). Small entrants may find it more difficult to compete for profitable non-WIC customers without acquiring WIC contracts. For example, Wyeth was a manufacturer with smaller market shares in the 1980s—9 percent in 1987 (Oliveira et al., 2004). Wyeth found it difficult to prosper in the United States once WIC initiated a competitive bidding system (An et al., 2023).[34] Meanwhile, Mead Johnson and Abbott (formerly Ross), the two manufacturers with the largest market shares in the 1980s—35 and 55 percent in 1987, respectively (Oliveira et al., 2004)—have held contracts covering the largest shares of WIC infants since at least 1996 (figure 7).

Figure 7
Manufacturer share of the WIC market, based on number of WIC participants in States where the manufacturer holds the infant formula contract, fiscal years 1996–2023



WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

Note: Each manufacturer's share of the WIC market is estimated using the number of WIC infants in the States in which the manufacturer held the WIC contract, unadjusted for breastfeeding rates. Data limitations before 2002 prevent the inclusion of participating infants from territories and Indian Tribal Organizations. Mead Johnson, Abbott, and Gerber® have been the only companies awarded WIC infant formula contracts since 1996.

Source: USDA, Economic Research Service using data from USDA, Food and Nutrition Service.

[34] The company noted increasing costs of competing in the overall nutrition market and the growth of the WIC program among its reasons for exiting the market (Wyeth-Ayerst Laboratories, 1996).

Retail Prices and Costs of Formula to Non-WIC Consumers

Trends in retail prices over time and following contract changes are not covered in this report, but other research has shown that single-supplier rebate contracts do place costs on consumers. WIC participants are required to choose the WIC contract formulas with few exceptions, such as health reasons. Although routine infant formula brands may be nutritionally interchangeable (O'Conner, 2009), research suggests that this choice limitation makes WIC consumers worse off in the sense that they experience a loss of utility when they are unable to choose a brand they otherwise would prefer (An et al., 2023). Contract changes that result in changes to the WIC infant formula brand may also impose a cost on WIC participants, who then must change brands during their child's first year of life, even if they prefer a different brand (Oliveira et al., 2011).

In terms of costs to non-WIC consumers and WIC consumers who may buy some formula out of pocket, Rojas and Wei (2019) found that retail prices of formula increased following a contract change. They estimated that retail prices for WIC-sized infant formula (12- to 13-ounce powder cans) increased by an average of $.06 per ounce for the contract formulas and $.05 per ounce for the noncontract formulas following a contract change (Rojas & Wei, 2019, p. 9). Retail prices for non-WIC-size infant formula also increased ($.07 per ounce compared with $.04 per ounce for the noncontract formulas) (Rojas & Wei, 2019, p. 9). This finding means that the WIC program and non-WIC consumers pay more for formula following a contract change and thereafter.

Other research found that wholesale prices are nearly double what they would be under a scenario in which the WIC program did not provide infant formula (Betson, 2009). This would be the case even if WIC State agencies did not take measures to contain formula costs. Betson (2009) and Prell (2004) attributed the higher wholesale prices to the price insensitivity of WIC consumers, and Betson (2009) and Davis (2012) concluded that the cost-containment systems operated by WIC do not further increase wholesale prices.

Conclusion

Infant formula rebates continue to be successful at reducing the costs to the government for providing infant formula to WIC infants. Rebates reduce the amount of the wholesale price (and, in some cases, the amount of the retail markup) that WIC pays for infant formula. This lowers the costs to the Federal Government for providing infant formula to WIC participants, and it reduces the amount of appropriated funding needed to serve all eligible individuals who choose to participate in WIC. In many cases, the contracts that were in effect in 2023 provided rebates that exceeded the manufacturers' wholesale price for a truckload of formula. Moreover, most contracts that were in effect in March 2023 resulted in lower net wholesale prices in both nominal and real terms relative to the contracts that preceded them. On average, real net wholesale prices decreased by $1.23 per 90 fluid ounces. Using 2022 caseload numbers, we estimated that infant formula costs to WIC were $131 million less (in 2023 dollars) under current contracts compared with the previous contract.[35]

Current regulations require WIC State agencies to employ the rebate system, or another system that generates similar or greater savings, for cost containment. When first established in 1989, the rebate system proved

[35] This is cost savings from WIC State agencies paying lower net wholesale prices for infant formula (under current contracts compared with previous contracts) holding factors, such as the number of WIC infants/units of infant formula purchased, constant. The cost saving is different from the total amount that WIC spends on infant formula each year, which depends on retail markup, net wholesale price, and number of units of formula purchased. The most recent available national estimates of WIC spending on infant formula are from 2018. In 2018, WIC spent more than $2.2 billion on infant formula before rebates and $514.5 million on infant formula after rebates. Rebates totaled more than $1.7 billion (Kline et al., 2020).

to be the most effective system for containing costs (U.S. General Accounting Office, 1990). Since the start of 2022, Nestlé/Gerber®, the manufacturer with smaller market shares than Mead Johnson and Abbott, has not bid on a rebate contract. In November 2022, Nestlé/Gerber® sold the Good Start® brand name to Perrigo along with an infant formula manufacturing facility (Nestlé, 2022). In March of 2023, 11 percent of WIC infants resided in States where Gerber® was the contract brand formula (figure 7). Perrigo is fulfilling the remaining Gerber® contracts in South Carolina and Oklahoma.

If only two manufacturers continue to bid on WIC contracts, net wholesale price bids—and, by extension, costs of infant formula to WIC and taxpayers—may increase. There is some evidence of this in the most recent bids. Rebate amounts, in real terms, decreased on all eight contracts awarded between October 1, 2022, and March 1, 2023, compared to previous contracts. For five of the eight contracts (62.5 percent) this resulted in higher winning net price bids (i.e., higher costs to WIC) compared to previous contracts.

More information and analyses could help to determine if other cost containment strategies (such as direct distribution) would be effective at reducing infant formula costs to WIC, as well as costs to consumers, and could be used to evaluate the potential effects of these other strategies on the overall infant formula market. Research considering these questions about alternative cost containment will want to distinguish between market conditions affected by the WIC program—a program that provides infant formula to nutritionally at-risk infants in low-income families—and market conditions affected by WIC State agencies' use of cost containment approaches.

Recent experiences have highlighted vulnerabilities associated with concentration in the production and distribution of infant formula. In early 2022, concerns about sanitary conditions led Abbott to recall some of its infant formulas and temporarily close one of its manufacturing plants in Sturgis, Michigan. The recall and temporary plant closure, coupled with supply chain struggles related to COVID-19, sparked a nationwide shortage of infant formula. USDA, FDA, and Congress responded quickly to allow flexibility in WIC infant formula purchases, including different package sizes, noncontract products, and, later, expanding and facilitating infant formula imports (USDA, FNS, 2023b; FDA, 2023). However, questions arose over whether WIC and competitive bidding processes exacerbated the shortage, given the large share of domestic infant formula purchased through the program (Federal Trade Commission (FTC), 2022). A 2024 Consensus Study Report by the National Academies of Sciences, Engineering, and Medicine (NASEM) concluded that production concentration posed the greatest risk to supply and the ability to mitigate the impacts of any disruptions (NASEM, 2024). The committee also concluded that competitive bidding for WIC infant formula contracts does not contribute to concentration in infant formula production in the United States, which is comparable to other high-income countries. Nevertheless, the fact that WIC infant formula contracts concentrate supply and sales within a State and that final retail supply is managed solely by distributors and retailers could influence how a supply disruption is experienced across the country (NASEM, 2024). Ultimately, the NASEM committee advises that sector-level risk management planning is a key element in reducing the negative impacts of future supply disruptions.

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Appendix A

Estimating the Share of Infant Formula in the United States That is Consumed by WIC Infants

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides infant formula to participating infants who are formula fed. There are two main approaches to estimate the share of all infant formula in the United States that is consumed by WIC-participating infants. The first is based on population counts, breastfeeding rates, and WIC caseload counts. The second is based on sales of infant formula. We opted to use the population approach because we only have dollar sales of infant formula (instead of volume sales), and we did not want our estimates conflated by price differences across geography, brands, or formula types.

Using the population-based approach and USDA's Food and Nutrition Service (FNS) data on WIC eligibility and participation (Gray et al., 2022), along with breastfeeding data from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC, 2023), we estimated the percentage of all infant formula in the United States in 2020 that was consumed by WIC infants.[36] Our population-based approach incorporated rates of partial breast/formula feeding to improve on an earlier method used by Oliveria et al. (2010). Based on our approach, detailed below, an estimated half of all infant formula in the United States was consumed by WIC infants in 2020.

Step 1: Estimating the number of infants by WIC eligibility status

Each year, FNS sponsors a study estimating the number of U.S. infants eligible to participate in WIC in an average month. In 2020, an estimated 1,881,435 infants per month were eligible to participate in the program and an estimated 1,536,838 infants participated (Gray et al., 2022). Subtracting the average number of infants who participated in WIC in 2020 from the number of eligible infants resulted in an estimated 344,597 eligible but not participating infants per month (Gray et al., 2022). Subtracting the estimated number of eligible infants (i.e., both participants and eligible nonparticipants) from the estimated total population of U.S. infants in 2020 resulted in an estimated 1,704,869 ineligible infants (Gray et al., 2022).

Table A.1
Estimated average monthly number of U.S. infants by WIC eligibility status, 2020

WIC status	Number of infants
WIC infant participants	1,536,838
Eligible nonparticipant infants	344,597
Ineligible infants	1,704,869
Total infants	3,586,304

WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

Source: USDA, Economic Research Service calculations based on data from Gray K., Kessler C., Rozen J., Bryant A., Griffiths R., & Wakar B. (2022), National- and state-level estimates of the special supplemental nutrition program for women, infants, and children (WIC) eligibility and WIC program reach in 2020 (Contract Number 12319821F0054), U.S. Department of Agriculture, Food and Nutrition Service.

[36] CDC breastfeeding data provide information about the feeding behaviors of the WIC and non-WIC population and 2020 was the most recent year of information available when writing this report. The CDC estimates of breastfeeding among WIC infants, including ever breastfed (74 percent), breastfed at 6 months (42.7 percent), and breastfed at 11 months (24.3 percent), are higher than USDA, FNS estimates from WIC administrative records of 71.6 percent, 22.1 percent, and 12.7 percent, respectively (Kline et al., 2022). Because USDA, FNS does not estimate non-WIC infant breastfeeding rates, we cannot determine whether using the CDC data affected our estimated share of infant formula consumed by WIC infants.

Step 2: Computing an average monthly fully formula feeding rate by WIC status

CDC reports breastfeeding rates by WIC status at initiation, at 6 months, and at 12 months (table A.2). We took an average of the three breastfeeding rates across each of the WIC status categories to derive monthly averages. We subtracted the monthly average breastfeeding rate from 100 for each of the WIC status categories to derive a monthly average fully formula feeding (i.e., nonbreastfeeding) rate (table A.2).

Table A.2
Breastfeeding rates by duration and WIC status, 2020

WIC status	Ever breastfed	Breastfed at 6 months	Breastfed at 12 months	Monthly average breastfeeding rate	Monthly average formula feeding rate
			(Percent)		
WIC	74.0	42.7	24.3	47.0	53.0
Eligible nonparticipant infants	84.3	62.3	43.2	63.3	36.7
Ineligible infants	91.5	71.7	48.7	70.6	29.4

WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

Source: USDA, Economic Research Service based on data from U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

Step 3: Computing an average monthly partially breastfeeding rate by WIC status

Some breastfeeding infants are supplemented with infant formula (i.e., the infants are partially breastfed and may therefore consume less infant formula than infants who are fully formula feeding).[37] CDC reports breastfeeding rates at 6 months and exclusive breastfeeding rates through 6 months by WIC status. We divided the exclusive breastfeeding rate through 6 months by the any-breastfeeding rate at 6 months and subtracted this number from 1 to derive a monthly average partial breastfeeding rate by WIC status (table A.3). This number represents the percentage of breastfeeding infants who also consume infant formula.

Table A.3
Average percentage of breastfeeding infants at 6 months by WIC status, 2020

WIC status	Any breastfeeding at 6 months	Exclusive breastfeeding through 6 months	Average monthly partial breastfeeding among breastfeeding infants
		(Percent)	
WIC	42.7	18.0	57.8
Eligible nonparticipant infants	62.3	31.9	48.8
Ineligible infants	71.7	31.0	56.8

WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

Source: USDA, Economic Research Service calculations based on data from U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

[37] WIC defines infants who are both breastfeeding and formula feeding as partially breastfeeding.

Step 4: Estimating the average monthly number of fully formula fed and partially breastfed infants

We multiplied the average number of all infants (table A.1) by the average monthly fully formula feeding rate from table A.2 to derive the estimated average monthly number of fully formula feeding infants (table A.4). To derive the number of partially breastfed infants, we subtracted the number of fully formula feeding infants from the number of all infants by WIC status. We then multiplied the difference, which represents the average number of breastfeeding infants, by the average monthly partial breastfeeding rate among breastfed infants from table A.3.

Table A.4
Estimated average monthly number of formula fed infants by WIC status, 2020

WIC status	Average monthly number of infants	Average number of fully formula fed infants	Average number of partially breastfed infants	Average number of formula fed infants	Percent of all formula fed infants
WIC participant	1,536,838	814,524	417,497	1,023,273	50.0
Eligible nonparticipant infants	344,597	126,582	106,391	179,778	8.8
Ineligible infants	1,704,869	500,663	683,989	842,658	41.2
Total	3,586,304	1,441,769	1,207,878	2,045,708	

WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

Note: We took the sum of the number of fully formula fed infants and one-half of the number of partially breastfed infants from table A5 to derive an estimated average number of formula fed infants.

Source: USDA, Economic Research Service calculations based on data from Gray K., Kessler C., Rozen J., Bryant A., Griffiths R., & Wakar, B. (2022), National- and state-level estimates of the special supplemental nutrition program for women, infants, and children (WIC) eligibility and WIC program reach in 2020 (Contract Number 12319821F0054), U.S. Department of Agriculture, Food and Nutrition Service; and U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

Step 5: Derive an estimated average number of formula fed infants

We took the sum of the number of fully formula fed infants and one-half of the number of partially breastfed infants to derive an estimated average number of formula fed infants (table A.4). We reduced the number of partially breastfed infants by half to account for the lesser amount of formula the infants receive, compared to fully formula fed infants.[38]

Step 6. Estimate WIC's share of the infant formula market

Summing the estimated average number of formula fed infants across the WIC status groups resulted in an estimated total average of 2,045,653 infants (table A.4). The estimated average number of formula fed WIC infants (1,023,437) accounted for 50 percent of the estimated total average of all formula fed infants. This number represents WIC's estimated share of all infant formula consumed in 2020.

[38] We chose to reduce the number of partially breastfed infants by half since, under current WIC regulations, the maximum monthly allowance of formula for partially breastfed infants is about half of the maximum monthly allowance for fully formula fed infants.

Assumptions

Assumption 1: If an infant wasn't breastfeeding, it was consuming formula. For example, if an infant was never breastfed, it was assumed that the infant consumed formula for their entire first year of life. If an infant stopped breastfeeding at some point, it was assumed that the infant consumed formula for the remainder of their first year.

Assumption 2: The formula needs of infants vary by infant's age. Infants' formula needs increase at first as infants grow, then decrease once solid foods are introduced. We assumed that the age distribution of WIC formula fed infants was similar to that of formula fed eligible and noneligible nonparticipants.

Assumption 3: All formula consumed by a WIC infant was provided through WIC. That is, WIC infants did not consume any non-WIC (or out-of-pocket) infant formula.

Assumption 4: Among formula fed infants, the amount of formula consumed was the same regardless of WIC status. That is, on average, fully formula fed WIC infants consumed the same amount of formula as fully formula fed nonparticipants (both eligible and ineligible). Similarly, we assumed that partially breastfed WIC infants consumed the same amount of formula as partially breastfed nonparticipants (both eligible and ineligible).

Appendix B

Origins of WIC Infant Formula Rebates

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) began operating in 1974. Before 1987, only a handful of U.S. States operated cost containment programs for infant formula. Vermont, which used a home delivery food delivery system, used competitive bidding to purchase its infant formula, where the lowest bidder won the State contract (Harvey et al., 1988). Counties in Ohio and Maryland that operated a home delivery system also required that the formula brand purchased for the lowest price be the primary brand of formula provided to WIC infants. Mississippi, which used the direct distribution food delivery system, used competitive bidding to select the winning formula manufacturer based on the lowest price offered. The other States, all of which used retail food delivery systems to distribute WIC foods, purchased infant formula at full retail prices.

In the mid-1980s, infant formula accounted for a large and increasing share of total WIC food costs. To control costs, Tennessee implemented a rebate system in June 1987 (Harvey et al., 1988). Later that year, Oregon became the second State to implement a competitively bid single source exclusive rebate contract. Other States soon followed.

On October 1, 1988, Public Law 100–460 required that all State WIC agencies explore the feasibility of implementing cost containment procedures for acquiring infant formula and, if the procedures were determined to lower costs, begin implementing the cost containment system within a year. Although States had the option of using a home delivery system (Vermont) or direct distribution system (Mississippi) to reduce costs, most States found these systems to be infeasible due to the costs associated with administering the systems or because of their impact on participants (U.S. Department of Agriculture (USDA), 1991). The rebate program proved successful for most States in reducing infant formula costs, thereby helping the program maximize the number of people who could participate.

On November 10, 1989, Public Law 101–147 required States to use competitive bidding or an alternate method that yielded savings equal to or greater than that produced by competitive bidding to procure infant formula. Indian Tribal Organizations with 1,000 or fewer WIC participants were, and still are, exempt from this requirement. Competitive bidding was defined as a procurement process in which the State WIC agency selects the single source (i.e., infant formula manufacturer) offering the lowest net wholesale price for the infant formula, as determined by the submission of sealed bids.

On May 21, 2022, Public Law 117–129 amended Section 17 of the Children Nutrition Act of 1966 to stipulate that infant formula rebate contracts include a plan for how the manufacturer would respond to a supply chain disruption. The legislation also gives USDA waiver authority over administrative requirements during emergencies, disasters, and supply chain disruptions; this authority includes modifying monthly allowances for infant formula. This legislation was passed in response to an infant formula shortage that resulted, in part, from a temporary closure of an Abbott plant in Michigan in February 2022.

Appendix C

Current and Previous Contracts

Table C.1
Start dates of current and previous contracts, July 2013–March 2023

WIC State agency/alliance	Number of States	Number of Indian Tribal Organizations	Number of Territories	Start date of current contract	Start date of previous contract
Pennsylvania	1	0	0	10/1/2018	10/1/2013
Southwest/Southeast Region	3	0	0	10/1/2018	10/1/2015
Georgia	1	0	0	10/29/2018	7/1/2013
National Association of State Procurement Officials	15	5	4	1/29/2019	10/1/2015
Tennessee	1	0	0	7/1/2019	7/1/2014
Indiana	1	0	0	10/1/2019	10/1/2015
Oklahoma	1	0	0	1/1/2020	10/1/2015
Florida	1	0	0	2/1/2020	2/1/2014
South Carolina	1	0	0	7/30/2020	4/1/2015
Mountain Plains Region	3	0	0	1/1/2021	10/1/2015
Wisconsin	1	0	0	1/1/2021	1/1/2016
New York	1	0	0	10/1/2021	7/1/2016
Alabama	1	0	0	10/1/2021	10/1/2016
Ohio	1	0	0	10/1/2021	10/1/2016
New England and Tribal Organization	5	1	0	10/1/2021	10/1/2016
North Dakota	1	0	0	10/1/2021	7/1/2017
Vermont (NEATO in current contract)	1	0	0	10/1/2021	9/29/2019
Kentucky	1	0	0	10/29/2021	11/1/2016
Michigan	1	0	0	11/1/2021	11/1/2016
Virginia	1	0	0	11/1/2021	11/1/2016
California	1	0	0	8/1/2022	8/1/2017
Mississippi	1	0	0	9/1/2022	9/1/2020
Southwest/Mountain Plains/ Midwest Region	3	1	0	10/1/2022	10/1/2017
Louisiana	1	0	0	1/1/2023	1/1/2018
Puerto Rico	0	0	1	1/1/2023	1/1/2018
Colorado	1	0	0	1/1/2023	1/1/2020
Illinois	1	0	0	2/1/2023	2/1/2018
New Jersey	1	0	0	3/1/2023	3/1/2018

WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

Note: The Southwest/Southeast Regions alliance includes Arkansas, New Mexico, and North Carolina. The National Association of State Procurement Officials includes Alaska, Arizona, Delaware, Hawaii, Idaho, Kansas, Maryland, Montana, Nevada, Oregon, Utah, Washington, Washington, DC, West Virginia, Wyoming, American Samoa, Guam, the Virgin Islands, the Commonwealth of the Northern Mariana Islands, Inter-Tribal Council of Arizona, Inter-Tribal Council of Nevada, Navajo Nation, Osage Nation, and Pueblo of Isleta. The Oklahoma State Alliance includes Oklahoma; Chickasaw Nation; Citizen Potawatomi Nation; Eight Northern Indian Pueblos, Incorporated; Mississippi Band of Choctaw Indians; Muscogee (Creek) Nation; Otoe-Missouria Tribe; and WCD Enterprises, Incorporated. Mountain Plains Region alliance includes Missouri, Nebraska, South Dakota, and North Dakota (beginning 10/1/2021; listed separately here). The New England and Tribal Organization alliance includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont (as of 10/1/2021; listed separately here), and Cherokee Nation of Oklahoma. The Southwest/Mountain Plains/Midwest Regions alliance includes Iowa, Minnesota, Texas, and the Choctaw Nation of Oklahoma.

Source: USDA, Economic Research Service based on USDA, Food and Nutrition Service data.

Appendix D

Milk-based Infant Formula Contract Holders

Table D.1
Milk based infant formula contract holders for all 50 U.S. States and Washington, DC, 1996–2023

State agency	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Alabama	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	M	M	M	M	M	M	M
Alaska[1]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Arizona[1]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Arkansas[2]	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	G	G	G	A	A	A	G	G	G	G	G
California	M	M	M	M	M	M	M	A	A	A	A	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	A	A
Colorado	M	M	M	M	M	M	M	A	A	A	A	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Connecticut[3]	M	M	M	M	M	M	M	M	M	M	M	G	G	G	G	G	M	M	M	M	M	A	A	A	A	A	A	A
Delaware[1]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Florida	M	M	M	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	M	M	M	M	M	M	M	M	M	M
Georgia	M	M	A	A	A	A	A	M	M	M	M	A	A	A	A	G	G	G	G	G	G	G	G	M	M	M	M	M
Hawaii[1]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Idaho[1]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Illinois	A	A	A	A	A	A	A	A	A	A	A	A	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Indiana	A	A	A	A	M	M	M	M	M	M	M	M	M	M	M	M	G	G	G	G	G	G	G	G	G	G	G	G
Iowa[4]	A	A	A	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	M
Kansas[5]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Kentucky	M	M	M	A	A	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	A	A
Louisiana	A	M	M	M	M	M	M	A	A	A	A	A	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A
Maine[3]	M	M	M	M	M	M	M	M	M	M	M	G	G	G	G	G	M	M	M	M	M	A	A	A	A	A	A	A
Maryland[6]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

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Table D.1

Milk based infant formula contract holders for all 50 U.S. States and Washington, DC, 1996–2023

State agency	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Massachusetts[3]	M	M	M	M	M	M	M	M	M	M	M	G	G	G	G	G	M	M	M	M	M	A	A	A	A	A	A	A
Michigan	A	A	A	A	A	A	A	A	A	A	A	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	A	A
Minnesota[4]	A	A	A	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	M
Mississippi	M	A	A	A	A	M	M	A	A	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Missouri[7]	M	M	G	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A
Montana[1]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Nebraska[8]	A	A	A	A	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A
Nevada[1]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
New Hampshire[3]	M	M	M	M	M	M	M	M	M	M	M	G	G	G	G	G	M	M	M	M	M	A	A	A	A	A	A	A
New Jersey	G	G	G	G	G	G	G	G	G	A	A	A	A	A	A	A	A	M	M	M	M	M	M	M	M	M	M	M
New Mexico[2]	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	G	G	G	A	A	A	G	G	G	G	G
New York	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
North Carolina[2]	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	G	G	G	A	A	A	G	G	G	G	G
North Dakota	M	M	M	A	A	G	G	G	G	G	G	G	G	G	G	G	M	M	M	M	M	M	M	M	M	M	A	A
Ohio	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G	G	G	G	G	M	M
Oklahoma	M	M	M	M	M	M	M	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Oregon[1]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Pennsylvania	M	M	M	A	A	A	A	A	A	A	A	A	G	G	G	G	G	A	A	A	A	A	A	A	A	A	A	A
Rhode Island[3]	M	M	M	M	M	M	M	M	M	M	M	G	G	G	G	G	M	M	M	M	M	A	A	A	A	A	A	A
South Carolina	M	M	M	M	A	A	A	A	A	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
South Dakota[8]	A	A	A	A	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A
Tennessee	M	M	M	A	A	A	A	A	G	G	G	G	G	G	G	G	G	A	A	A	A	A	A	A	A	A	A	A
Texas[4]	A	A	A	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	M

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Table D.1

Milk based infant formula contract holders for all 50 U.S. States and Washington, DC, 1996–2023

State agency	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Utah[1]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Vermont[9]	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G	G	G	A	A
Virginia	A	A	A	A	A	G	G	G	G	G	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Washington[1]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Washington, DC[6]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
West Virginia[10]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Wisconsin	A	A	A	A	A	A	A	A	A	A	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	A	A	A
Wyoming[1]	M	M	M	M	M	M	M	M	M	M	M	M	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

A=Abbott. M=Mead Johnson. G=Gerber®.

[1]National Association of State Procurement Officials.
[2]Southwest/Southeast Regions alliance.
[3]New England and Tribal Organization alliance.
[4]Southwest/Mountain Plains/Midwest Regions alliance.
[5]Joined Western States Contracting Alliance, now National Association of State Procurement Officials, in 2002.
[6]Mid-Atlantic alliance through 2001, then Western States Contracting Alliance, then National Association of State Procurement Officials.
[7]Mountain Plains Region alliance starting 2004.
[8]Nebraska and South Dakota in alliance through 2003.
[9]Joined New England and Tribal Organization alliance in 2022
[10]Joined Western States Contracting Alliance, now National Association of State Procurement Officials, in 2002.

Note: | indicates start of new contract.

Source: USDA, Economic Research Service based on bid data provided by USDA, Food and Nutrition Service.

Appendix E

Estimating Savings to WIC From Changes in Real Net Wholesale Prices Under Current and Prior Contracts

Following the approach used by Oliveira et al. (2010), we estimated how changes in real (i.e., adjusted for inflation) net wholesale prices impacted the costs of infant formula to the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) under current and prior contracts. In addition to information about net wholesale prices paid for milk based powder formula in State agencies' current and prior contracts, we used information about amounts of infant formula provided to infants of different ages in the WIC food packages and information about the numbers of WIC infants receiving infant formula in 2022.[39] Limiting our count of infants to 1 year (2022) ensured that the estimated change in costs between previous and current contracts was due solely to changes in net wholesale prices and not to changes in the numbers of infants participating in WIC (or the amount of infant formula purchased) across States over time.[40] Additionally, although a small share of formula fed infants who are issued contract formula in WIC receive soy based powder, our approach assumed that all formula fed infants in WIC received milk-based powder formula.

We obtained the average monthly number of fornula fed and partially breastfed infants participating in WIC in fiscal year 2022 by State and alliance from USDA's Food and Nutrition Service (table E1). The rest of this section outlines the steps we used to estimate savings to WIC from changes in net wholesale prices under current and prior contracts.

[39] An alternative to this approach would be to use information on WIC participant purchases of infant formula from WIC electronic benefit transfer transactions for each State in a year, such as 2022, and multiply units of infant formula purchased with WIC benefits by current and prior net wholesale prices. However, electronic benefit transfer data are not available for all States.

[40] This approach held retail markup constant. Estimating cost savings to WIC under current and prior contracts is not the same as comparing what WIC pays for infant formula from year to year, which depends on the net wholesale price and the retail markup for each unit, as well as the number of units of formula purchased. The most recent available national estimates of WIC spending on infant formula are from 2018. In 2018, WIC spent over $2.24 billion on infant formula before rebates and $514.5 million on infant formula after rebates. Rebates totaled more than $1.7 billion (Kline et al., 2020).

Table E.1

Formula fed participating WIC infants, fiscal year 2022

State/alliance	Monthly average number of fully formula fed infants	Monthly average number of partially breastfed infants
Pennsylvania	29,446	4,274
Southwest/Southeast Regions	61,046	11,137
Georgia	32,613	10,366
National Association of State Procurement Officials	100,392	36,464
Tennessee	21,195	6,680
Indiana	23,025	5,853
Oklahoma	15,342	1,031
Florida	57,275	28,592
South Carolina	16,918	3,364
Mountain Plains Region	23,915	5,150
Wisconsin	13,425	2,336
New York	41,449	32,111
Alabama	25,584	1,578
Ohio	34,270	1,780
New England and Tribal Organization	1,387	370
North Dakota	26,939	11,161
Vermont (NEATO in current contract)	912	406
Kentucky	19,130	4,689
Michigan	32,604	5,247
Virginia	20,653	3,777
California	101,876	40,411
Mississippi	15,445	2,391
Southwest/Mountain Plains/Midwest Region	91,737	94,012
Louisiana	21,326	3,867
Puerto Rico	10,401	2,982
Colorado	11,403	3,509
Illinois	28,226	11,104
New Jersey	16,692	10,858
Total	894,623	345,497

WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

Note: The Southwest/Southeast Regions alliance includes Arkansas, New Mexico, and North Carolina. The National Association of State Procurement Officials includes Alaska, Arizona, Delaware, Hawaii, Idaho, Kansas, Maryland, Montana, Nevada, Oregon, Utah, Washington, Washington, DC, West Virginia, Wyoming, American Samoa, Guam, the Virgin Islands, the Commonwealth of the Northern Mariana Islands, Inter-Tribal Council of Arizona, Inter-Tribal Council of Nevada, Navajo Nation, Osage Nation, and Pueblo of Isleta. The Oklahoma State Alliance includes Oklahoma; Chickasaw Nation; Citizen Potawatomi Nation; Eight Northern Indian Pueblos, Incorporated; Mississippi Band of Choctaw Indians; Muscogee (Creek) Nation; Otoe-Missouria Tribe; and WCD Enterprises, Incorporated. Mountain Plains Region alliance includes Missouri, Nebraska, South Dakota, and North Dakota (beginning 10/1/2021; listed separately here). The New England and Tribal Organization alliance includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont (as of 10/1/2021; listed separately here), and Cherokee Nation of Oklahoma. The Southwest/Mountain Plains/Midwest Regions alliance includes Iowa, Minnesota, Texas, and the Choctaw Nation of Oklahoma.

Source: USDA, Economic Research Service based on USDA, Food and Nutrition Service data.

Step 1: Estimate the amount of reconstituted infant formula issued to fully formula fed and partially breastfed WIC infants per month

Infants received different amounts of infant formula based on age and on formula feeding status (i.e., fully formula fed, partially breastfed, or fully breastfed). We used the age distribution profile for WIC infants and the maximum ounces of infant formula allowed per month in each food package for each age group to calculate a weighted average number of ounces of infant formula issued to fully or partially breastfed infants per month (table E2). We reduced the weighted average by 9 percent to account for the share of infant formula provided to WIC participants that was noncontract and, therefore, not eligible for a rebate (Kline et al., 2020).

Table E.2
Weighted-average number of ounces of reconstituted infant formula issued to formula fed WIC infants per month

Age distribution of infants	0–3 months	4–5 months	6–9 months	9–11 months	Total	
Number	1,531,912	52,068	58,183	46,894	1,689,057	
Percent	90.7	3.1	3.4	2.8	100.00	
Maximum reconstituted formula ounces allowed					**Weighted average**	**Adjustment for exempt formula**
Fully formula fed infants	823	896	630	630	813.24	740.05
Partially breastfed infants	246	460	315	315	256.89	233.77

WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

Note: The partially breastfed ounces of formula for infants ages 0–3 months are the average maximum allowed ounces for infants ages 0–1 month and 1–3 months. Formula issuance in the first month for partial breastfeeding infants is not routine. The issuance of up to 1 can of formula is based on a breastfeeding assessment. The total number of infants does not include infant participants with "no age reported."

Source: USDA, Economic Research Service calculations using data from Kline, N., Meyers, M. K., & Marr, J. (2020), *WIC participant and program characteristics 2018 food packages and costs report* (Contract No. AG-3198-K-15-0048), U.S. Department of Agriculture, Food and Nutrition Service, prepared by Insight Policy Research, Alexandria, VA; and USDA, Food and Nutrition Service.

Step 2: Estimate average change in net wholesale price per reconstituted ounce of powder formula

We multiplied the number of fully formula fed infants and partially breastfed infants participating in WIC by the estimated issuance amounts from step 1 to get a State specific estimate of the total number of infant formula ounces issued each month. The State specific number of ounces of formula was then multiplied by the State specific change in real net wholesale price (per reconstituted ounce) between the previous and current contracts to get the State-specific change in monthly infant-formula costs.

Step 3: Estimate the change in total annual formula costs

We multiplied the State specific monthly estimates from step 2 by 12 and summed across States to derive a national annual estimate of the change in total formula costs resulting from the change in real net wholesale prices. We estimated that under current contracts (as of March 2023), WIC paid $130.81 million less per year for infant formula than it would have under previous contracts.[41] This number was equivalent to the cost of supporting 142,000 persons in WIC for a year, or about 2.3 percent of the WIC caseload in fiscal year 2022.

[41] Using the same method with nominal net wholesale price instead of real net wholesale price resulted in cost savings of $111.5 million per year.