

PUTNAM MUNICIPAL OPPORTUNITIES TRUST
Form N-CSR
June 27, 2013

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM N-CSR

**CERTIFIED SHAREHOLDER REPORT OF REGISTERED
MANAGEMENT INVESTMENT COMPANIES**

Investment Company Act file number: (811-07626)

Exact name of registrant as specified in charter: Putnam Municipal Opportunities Trust

Address of principal executive offices: One Post Office Square, Boston, Massachusetts 02109

Name and address of agent for service: Robert T Burns, Vice President
One Post Office Square
Boston, Massachusetts 02109

Copy to: John W. Gerstmayr, Esq.
Ropes & Gray LLP
800 Boylston Street
Boston, Massachusetts 02199-3600

Registrant's telephone number, including area code: (617) 292-1000

Date of fiscal year end: April 30, 2013

Date of reporting period: May 1, 2012 — April 30, 2013

Item 1. Report to Stockholders:

The following is a copy of the report transmitted to stockholders pursuant to Rule 30e-1 under the Investment Company Act of 1940:

Putnam Municipal Opportunities Trust

Annual report

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Consider these risks before investing: Lower-rated bonds may offer higher yields in return for more risk. Bond investments are subject to interest-rate risk, which means the prices of the fund's bond investments are likely to fall if interest rates rise. Bond investments also are subject to credit risk, which is the risk that the issuer of the bond may default on payment of interest or principal. Interest-rate risk is generally greater for longer-term bonds, and credit risk is generally greater for below-investment-grade bonds, which may be considered speculative. Unlike bonds, funds that invest in bonds have ongoing fees and expenses. The fund's shares trade on a stock exchange at market prices, which may be lower than the fund's net asset value. You can lose money by investing in the fund.

Message from the Trustees

Dear Fellow Shareholder:

Equities around the world have generally demonstrated a positive trend in early 2013. However, after a strong 2012, fixed-income markets have been facing challenges and increased volatility in 2013.

Supportive macroeconomic data, notably better housing and employment data in the United States, and the coordinated stimulative monetary policies of central banks around the world are helping to boost equity values, although investor confidence remains tempered. Markets continue to confront a variety of macroeconomic and fiscal challenges worldwide — from budget concerns in the United States to the eurozone's debt-related troubles.

Investor apprehension today can be linked to the heightened volatility that has challenged markets for over a decade. In this fundamentally changed environment, Putnam's equity and fixed-income teams are focused on integrating innovative investing ideas into our more time-tested, traditional strategies. It is also important to rely on the guidance of your financial advisor, who can help ensure that your portfolio matches your individual goals and tolerance for risk.

We would like to extend a welcome to new shareholders of the fund and to thank you for investing with Putnam.

About the fund

Potential for income exempt from federal income tax

Investing in municipal bonds through a fund such as Putnam Municipal Opportunities Trust can help address a significant challenge: taxes on your investment income. While the stated yields on municipal bonds are usually lower than those of taxable bonds, the income most of these bonds pay has the advantage of being exempt from federal tax.

Municipal bonds are typically issued by states and local municipalities to raise funds for building and maintaining public facilities. The bonds are backed by the issuing city or town, by revenues collected from usage fees, or by state tax revenues. Depending on the type of backing, the bonds will have varying degrees of credit risk, which is the risk that the issuer will not be able to repay the bond.

The fund also combines bonds of differing credit quality. In addition to investing in high-quality bonds, the fund's managers allocate a portion of the portfolio to lower-rated bonds, which may offer higher income in return for more risk. When deciding whether to invest in a bond, the managers consider factors such as credit risk, interest rate risk, and the risk that the bond will be prepaid.

Once the fund has invested in a bond, the managers continue to monitor developments that affect the overall bond market, the sector, and the issuer of the bond.

The goal of this in-depth research and active management is to stay a step ahead of the industry and pinpoint opportunities for investors.

How do closed-end funds differ from open-end funds?

More assets at work While open-end funds need to maintain a cash position to meet redemptions, closed-end funds are not subject to redemptions and can keep more of their assets invested in the market.

Traded like stocks Closed-end fund shares are traded on stock exchanges, and their market prices fluctuate in response to supply and demand, among other factors.

Net asset value vs. market price Like an open-end fund's net asset value (NAV) per share, the NAV of a closed-end fund share is equal to the current value of the fund's assets, minus its liabilities, divided by the number of shares outstanding. However, when buying or selling closed-end fund shares, the price you pay or receive is the market price. Market price reflects current market supply and demand and may be higher or lower than the NAV.

Data are historical. Past performance does not guarantee future results. More recent returns may be less or more than those shown. Investment return and net asset value will fluctuate, and you may have a gain or a loss when you sell your shares. Performance assumes reinvestment of distributions and does not account for taxes. Fund returns in the bar chart are at NAV. See pages 5 and 11-12 for additional performance information, including fund returns at market price. Index and Lipper results should be compared with fund performance at NAV. Fund results reflect the use of leverage, while index results are unleveraged and Lipper results reflect varying use of, and methods for, leverage. Lipper calculates performance differently than the closed-end funds it ranks, due to varying methods for determining a fund's monthly reinvestment NAV.

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Interview with your fund's portfolio manager

Putnam Municipal Opportunities Trust posted solid gains during its fiscal year. How would you describe the investment environment?

For most of the past 12 months, the investment environment was quite positive for municipal bonds. Demand remained high, supply was relatively tight, and fundamentals in the municipal market continued to improve, albeit gradually. There were some bumps along the way, however. As 2012 came to a close, investor uncertainty surrounding the fiscal cliff led to a sell-off in December. By way of background, as part of the 2011 debt-ceiling negotiations, Congress had scheduled \$1.2 trillion in tax increases and spending cuts to begin taking effect on January 1, 2013. Ultimately, existing tax rates were preserved for the vast majority of taxpayers, but the political gridlock leading up to the final legislation sent some investors to the sidelines to wait for greater clarity.

Regarding more recent performance, the beginning of the year tends to be one of tempered demand, particularly as individual investors are making adjustments to their portfolios in advance of tax season. At the same time, issuance tends to be lighter before beginning to pick back up toward the end of March. This seasonal trend, along with increased volatility in Treasury rates, partially explains the municipal bond market's lack-luster performance in March. During April, the municipal market followed the Treasury

This comparison shows your fund's performance in the context of broad market indexes for the 12 months ended 4/30/13. See pages 4 and 11-12 for additional fund performance information. Index descriptions can be found on page 13.

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market to some extent and benefited as rates moved lower and prices moved higher.

Despite the muted performance in the first quarter, we saw some encouraging trends on the heels of a strong April. Refinancing activity has been high, as issuers are retiring higher-coupon bonds whenever possible and replacing them with lower-yielding debt. While this makes it difficult to add higher-yielding securities to the portfolio, it has simultaneously helped buoy prices and demand — the seasonal weakness notwithstanding — and this has been true particularly for more seasoned, or mature, bonds with coupons above today's prevailing rates. In addition, increased clarity on tax rates, at least for the near future, has had a positive influence on the market.

Against this backdrop, tax-exempt bonds posted gains and outpaced the broad taxable bond market, as measured by the Barclays U.S. Aggregate Bond Index. Moreover, the fund outperformed its benchmark index, although it did trail the average return of its Lipper peer group.

You mentioned the fiscal cliff and related legislation. How did policy developments impact the municipal bond market?

For months now, the focal point of many discussions about municipal bonds has been federal policy and the potential risks it entails. On January 1, 2013, Congress enacted a last-minute tax deal to raise rates on top earners while preserving existing brackets for most other taxpayers. Although the new, higher rates for top earners have likely bolstered demand for municipal bonds by making their taxable equivalent yields that much more attractive, the correlation between tax rates and demand is rarely one-to-one. Taxes

Credit qualities are shown as a percentage of portfolio market value as of 4/30/13. A bond rated Baa or higher (MIG3/VMIG3 or higher, for short-term debt) is considered investment grade. The chart reflects Moody's ratings; percentages may include bonds or derivatives not rated by Moody's but rated by Standard & Poor's (S&P) or, if unrated by S&P, by Fitch ratings, and then included in the closest equivalent Moody's rating. Ratings may vary over time.

Credit qualities are included for portfolio securities and are not included for derivative instruments and cash. The fund itself has not been rated by an independent rating agency.

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are one factor among many that investors consider when weighing options for their fixed-income portfolios and, to that end, the question of whether the income from municipal bonds will remain fully tax free is still unsettled. One potential outcome in a "grand bargain" on tax reform would cap the income level of municipal bond interest that can be claimed tax free, possibly at 28%. While we are skeptical of the prospects for any further significant tax reform in the near term under a divided Congress, we do believe it remains a possibility. We believe it is highly likely, however, that changes to the tax treatment of municipal bonds will continue to be part of any tax-reform negotiations, so some short-term headline risk does exist. We are monitoring the situation closely.

Beyond the issue of taxes, since January much of the talk among federal lawmakers has revolved around sequestration, the other half of the fiscal cliff that mandated 2% across-the-board spending cuts. While the political rhetoric associated with those cuts often has painted them as catastrophic, we believe any fallout for most states will be fairly benign. The cuts certainly won't be beneficial for states and local communities, but their impact will be staggered over time, and we believe widespread negative effects are unlikely. Sectors and localities that benefit most from federal support and areas that are heavily reliant on defense spending are the most vulnerable, in our opinion. But at this

Top ten state allocations are shown as a percentage of portfolio market value as of 4/30/13. Investments in Puerto Rico represented 3.0% of portfolio market value. Summary information may differ from the portfolio schedule included in the financial statements due to the differing treatment of interest accruals, the floating rate portion of tender option bonds, derivative securities (if any), and classification of securities for presentation purposes.

point, it is difficult to quantify exactly how sequestration will affect states' finances. The ultimate impact will depend on how well these states have prepared and budgeted for the sequestration cuts.

Outside of the sequestration issue, how are states' finances faring?

Generally, we have been seeing improvements across the board. According to the National Conference of State Legislatures, 45 states reported that they are likely to meet or exceed their revenue projections for fiscal year 2013. While this is an encouraging trend, challenges remain at the local level. Many states have lowered expenses by reducing their financial support to cities and counties. Should the economy begin to slow, this would almost certainly negatively affect municipal finances, in our opinion. It is important to keep in mind that general obligation bonds comprise approximately one third of the overall municipal market, while two thirds are revenue bonds. Generally speaking, we feel that revenue credits are faring well, and we continue to see opportunities in higher education, utility, and health-care bonds, among others.

How would you describe the default picture in the municipal bond market?

For calendar year 2012, bankruptcy filings represented approximately 0.12% of the \$3.7 trillion municipal bond market. This is in line with historical averages, and we do not believe defaults will increase meaningfully in the near future. We do expect to see occasional isolated incidents of insolvency, however, which can create headline risk. For example, a fiscal emergency was recently declared in Detroit, Michigan, which has been in financial distress for some time now. In

This chart shows how the fund's top weightings have changed over the past six months. Allocations are represented as a percentage of portfolio market value. Current period summary information may differ from the portfolio schedule included in the financial statements due to the inclusion of derivative securities, any interest accruals, the exclusion of as-of trades, if any, and the use of different classifications of securities for presentation purposes. Holdings and allocations may vary over time.

other news, credit rating agencies Moody's and Standard & Poor's recently downgraded Puerto Rico's debt. The government of Puerto Rico has since put in proposals for pension reform in an attempt to repair its credit profile. Perhaps the most significant development, however, is the bankruptcy proceedings in Stockton, California. The city filed for bankruptcy protection last summer, and the eventual outcome of the legal proceedings, with bondholders on one side and pension funds on the other, may set a precedent in the market, and could impact how other distressed cities negotiate with creditors.

How did you position the portfolio during the period?

As has been our strategy for some time, we continued to favor essential service revenue bonds over local general obligation bonds. From a credit-quality perspective, the BBB-rated segment of the curve, as well as other rating categories of the high-yield municipal bond market, continue to offer attractive relative value opportunities, in our analysis. In terms of maturities, we find 10 to 20 years to be the optimal part of the yield curve in today's environment. We continue to have a favorable outlook and have overweighted investments in several sectors of the municipal bond market, including continuing-care retirement communities, utilities, higher education, and

airlines. Generally speaking, the supply/demand picture becomes more favorable in the summer months when reinvestment demand is typically the highest of the year — thereby providing support for municipal bond prices. That said, other factors such as interest rates and the direction of the economy, among others, could influence market activity. If there is a technical imbalance throughout the spring months, our positioning should allow us to take advantage of any dislocations in the market.

How does the fund use leverage, and why?

Leverage generally involves borrowing funds or raising additional capital [e.g., by issuing debt securities or preferred stock] and investing the proceeds with the expectation of producing a return that exceeds the cost of borrowing or of the additional capital. Unlike open-end funds, closed-end funds, such as your fund, are permitted to engage in leverage by raising additional capital. Preferred share leverage is your fund's primary source of leverage. We also use tender option bonds as a supplemental source of leverage.

Importantly, the purpose of leverage is to seek to enhance returns for the fund's common shareholders. Leverage offers opportunities for increased investment yield and also amplifies common shareholders' exposure to the effects of gains and losses in the fund's investment portfolio.

Are there risks associated with the use of leverage?

We believe common shareholders generally have been well served by the fund's use of leverage in recent years. However, the use of leverage presents certain risks for common shareholders. Because, as noted above, leverage amplifies gains and losses, the net asset value of the common shares and the returns earned by common shareholders will be more volatile in a leveraged fund than in a fund that does not use leverage. In addition, if the borrowing costs [which are typically based on short-term interest rates] associated with leverage rise, the costs of leverage will increase, most likely reducing the returns earned by common shareholders. We consider these risks and may adjust the fund's investment exposures, taking into account leverage and other factors, as appropriate under market conditions.

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The fund reduced its distribution rate during the period. What led to that decision?

The fund's monthly distribution rate was lowered to \$0.0559 per share from \$0.0663 in September, due to a reduction in the amount of income earned by the portfolio, which resulted from declining yields in the marketplace generally.

What is your outlook for the second half of 2013?

We continue to have a constructive outlook for municipal bonds, though we believe that returns in 2013 will be less about price appreciation and more about coupon income in the tax-exempt market. While spreads are much narrower than they were at their peak, they remain attractive within certain credit-quality areas, in our opinion. Although they softened somewhat in March, technical factors in the market — specifically, continued refunding activity and stable investor demand — generally have remained supportive in recent months. While investors now have more near-term certainty on tax rates for 2013, many issues remain unresolved, including federal budget sequestration, the debt ceiling, and the potential for broader tax reform during the year, all of which could affect the value of municipal bonds. As always, we are monitoring the situation closely and positioning the fund accordingly, based on our analysis.

Thank you, Thalia, for bringing us up to date.

The views expressed in this report are exclusively those of Putnam Management and are subject to change. They are not meant as investment advice.

Please note that the holdings discussed in this report may not have been held by the fund for the entire period. Portfolio composition is subject to review in accordance with the fund's investment strategy and may vary in the

future. Current and future portfolio holdings are subject to risk.

Portfolio Manager **Thalia Meehan** holds a B.A. from Williams College. A CFA charterholder, Thalia joined Putnam in 1989 and has been in the investment industry since 1983.

In addition to Thalia, your fund's portfolio managers are Paul M. Drury, CFA, and Susan A. McCormack, CFA.

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Your fund's performance

This section shows your fund's performance, price, and distribution information for periods ended April 30, 2013, the end of its most recent fiscal year. In accordance with regulatory requirements for mutual funds, we also include performance information as of the most recent calendar quarter-end. Performance should always be considered in light of a fund's investment strategy. Data represent past performance. Past performance does not guarantee future results. More recent returns may be less or more than those shown. Investment return, net asset value, and market price will fluctuate, and you may have a gain or a loss when you sell your shares.

Fund performance Total return for periods ended 4/30/13

	NAV	Market price	Barclays Municipal Bond Index	Lipper General & Insured Municipal Debt Funds (leveraged closed-end) category average*
Annual average (life of fund) (5/28/93)	6.64%	5.94%	5.72%	6.52%
10 years	95.78	90.39	63.70	92.72
Annual average	6.95	6.65	5.05	6.74
5 years	51.75	58.20	34.37	53.25
Annual average	8.70	9.61	6.09	8.88
3 years	36.54	33.93	19.72	36.60
Annual average	10.94	10.23	6.18	10.94
1 year	10.19	5.22	5.19	10.58

Performance assumes reinvestment of distributions and does not account for taxes. Index and Lipper results should be compared to fund performance at net asset value. Fund results reflect the use of leverage, while index results are unleveraged and Lipper results reflect varying use of, and methods for, leverage. Lipper calculates performance differently than the closed-end funds it ranks, due to varying methods for determining a fund's monthly reinvestment NAV.

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* Over the 1-year, 3-year, 5-year, 10-year, and life-of-fund periods ended 4/30/13, there were 76, 75, 73, 70, and 40 funds, respectively, in this Lipper category.

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Fund price and distribution information For the 12-month period ended 4/30/13

Distributions — Common shares

Number	12
Income 1	\$0.7124
Capital gains 2	—
Total	\$0.7124

	Series B (3,417 shares)	Series C (3,737 shares)
Distributions — Preferred shares		
Income 1	\$62.26	\$62.36
Capital gains 2	—	—
Total	\$62.26	\$62.36

Share value	NAV	Market price
4/30/12	\$12.97	\$12.70
4/30/13	13.54	12.66

Current rate (end of period)	NAV	Market price
Current dividend rate 3	4.95%	5.30%
Taxable equivalent 4	8.75	9.36

The classification of distributions, if any, is an estimate. Final distribution information will appear on your year-end tax forms.

1 For some investors, investment income may be subject to the federal alternative minimum tax. Income from federally exempt funds may be subject to state and local taxes.

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² Capital gains, if any, are taxable for federal and, in most cases, state purposes.

³ Most recent distribution, excluding capital gains, annualized and divided by NAV or market price at end of period.

⁴ Assumes maximum 43.40% federal tax rate for 2013. Results for investors subject to lower tax rates would not be as advantageous.

Fund performance as of most recent calendar quarter

Total return for periods ended 3/31/13

	NAV	Market price
Annual average (life of fund) (5/28/93)	6.58%	5.91%
10 years	95.35	94.38
Annual average	6.93	6.87
5 years	51.79	59.19
Annual average	8.70	9.74
3 years	37.08	32.46
Annual average	11.09	9.82
1 year	10.34	5.89

See the discussion following the Fund performance table on page 11 for information about the calculation of fund performance.

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Terms and definitions

Important terms

Total return shows how the value of the fund's shares changed over time, assuming you held the shares through the entire period and reinvested all distributions in the fund.

Net asset value (NAV) is the value of all your fund's assets, minus any liabilities, divided by the number of outstanding shares.

Market price is the current trading price of one share of the fund. Market prices are set by transactions between buyers and sellers on exchanges such as the New York Stock Exchange.

Fixed-income terms

Current yield is the annual rate of return earned from dividends or interest of an investment. Current yield is expressed as a percentage of the price of a security, fund share, or principal investment.

Yield curve is a graph that plots the yields of bonds with equal credit quality against their differing maturity dates, ranging from shortest to longest. It is used as a benchmark for other debt, such as mortgage or bank lending rates.

Comparative indexes

Barclays Municipal Bond Index is an unmanaged index of long-term fixed-rate investment-grade tax-exempt bonds.

Barclays U.S. Aggregate Bond Index is an unmanaged index of U.S. investment-grade fixed-income securities.

BofA Merrill Lynch U.S. 3-Month Treasury Bill Index is an unmanaged index that seeks to measure the performance of U.S. Treasury bills available in the marketplace.

S&P 500 Index is an unmanaged index of common stock performance.

Indexes assume reinvestment of all distributions and do not account for fees. Securities and performance of a fund and an index will differ. You cannot invest directly in an index.

Lipper is a third-party industry-ranking entity that ranks mutual funds. Its rankings do not reflect sales charges. Lipper rankings are based on total return at net asset value relative to other funds that have similar current investment styles or objectives as determined by Lipper. Lipper may change a fund's category assignment at its discretion. Lipper category averages reflect performance trends for funds within a category.

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Other information for shareholders

Important notice regarding share repurchase program

In September 2012, the Trustees of your fund approved the renewal of a share repurchase program that had been in effect since 2005. This renewal will allow your fund to repurchase, in the 12 months beginning October 8, 2012, up to 10% of the fund's common shares outstanding as of October 7, 2012.

Proxy voting

Putnam is committed to managing our mutual funds in the best interests of our shareholders. The Putnam funds' proxy voting guidelines and procedures, as well as information regarding how your fund voted proxies relating to portfolio securities during the 12-month period ended June 30, 2012, are available in the Individual Investors section of putnam.com, and on the Securities and Exchange Commission (SEC) website, www.sec.gov. If you have questions about finding forms on the SEC's website, you may call the SEC at 1-800-SEC-0330. You may also obtain the Putnam funds' proxy voting guidelines and procedures at no charge by calling Putnam's Shareholder Services at 1-800-225-1581.

Fund portfolio holdings

The fund will file a complete schedule of its portfolio holdings with the SEC for the first and third quarters of each fiscal year on Form N-Q. Shareholders may obtain the fund's Forms N-Q on the SEC's website at www.sec.gov. In addition, the fund's Forms N-Q may be reviewed and copied at the SEC's Public Reference Room in Washington, D.C.

You may call the SEC at 1-800-SEC-0330 for information about the SEC's website or the operation of the Public Reference Room.

Trustee and employee fund ownership

Putnam employees and members of the Board of Trustees place their faith, confidence, and, most importantly, investment dollars in Putnam mutual funds. As of April 30, 2013, Putnam employees had approximately \$381,000,000 and the Trustees had approximately \$91,000,000 invested in Putnam mutual funds. These amounts include investments by the Trustees' and employees' immediate family members as well as investments through retirement and deferred compensation plans.

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Important notice regarding Putnam's privacy policy

In order to conduct business with our shareholders, we must obtain certain personal information such as account holders' names, addresses, Social Security numbers, and dates of birth. Using this information, we are able to maintain accurate records of accounts and transactions.

It is our policy to protect the confidentiality of our shareholder information, whether or not a shareholder currently owns shares of our funds. In particular, it is our policy not to sell information about you or your accounts to outside marketing firms. We have safeguards in place designed to prevent unauthorized access to our computer systems and procedures to protect personal information from unauthorized use.

Under certain circumstances, we must share account information with outside vendors who provide services to us, such as mailings and proxy solicitations. In these cases, the service providers enter into confidentiality agreements with us, and we provide only the information necessary to process transactions and perform other services related to your account. Finally, it is our policy to share account information with your financial representative, if you've listed one on your Putnam account.

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Summary of Putnam Closed-End Funds' Amended and Restated Dividend Reinvestment Plans

Putnam High Income Securities Fund, Putnam Managed Municipal Income Trust, Putnam Master Intermediate Income Trust, Putnam Municipal Opportunities Trust and Putnam Premier Income Trust (each, a "Fund" and collectively, the "Funds") each offer **dividend reinvestment plan** (each, a "Plan" and collectively, the "Plans"). If you participate in a Plan, all income dividends and capital gain distributions are **automatically reinvested** in Fund shares by the Fund's agent, Putnam Investor Services, Inc. (the "Agent"). If you are not participating in a Plan, every month you will receive all dividends and other distributions in cash, paid by check and mailed directly to you.

Upon a purchase (or, where applicable, upon registration of transfer on the shareholder records of a Fund) of shares of a Fund by a registered shareholder, each such shareholder **will be deemed to have elected to participate** in that Fund's Plan. Each such shareholder will have all distributions by a Fund automatically reinvested in additional shares, unless such shareholder elects to terminate participation in a Plan by instructing the Agent to pay future distributions in cash. Shareholders who were not participants in a Plan as of January 31, 2010, will continue to receive distributions in cash but may enroll in a Plan at any time by contacting the Agent.

If you participate in a Fund's Plan, the Agent will automatically reinvest subsequent distributions, and the Agent will send you a confirmation in the mail telling you how many additional shares were issued to your account.

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To change your enrollment status or to request additional information about the Plans, you may contact the Agent either in writing, at P.O. Box 8383, Boston, MA 02266-8383, or by telephone at 1-800-225-1581 during normal East Coast business hours.

How you acquire additional shares through a Plan If the market price per share for your Fund's shares (plus estimated brokerage commissions) is greater than or equal to their net asset value per share on the payment date for a distribution, you will be issued shares of the Fund at a value equal to the higher of the net asset value per share on that date or 95% of the market price per share on that date.

If the market price per share for your Fund's shares (plus estimated brokerage commissions) is less than their net asset value per share on the payment date for a distribution, the Agent will buy Fund shares for participating accounts in the open market. The Agent will aggregate open-market purchases on behalf of all participants, and the average price (including brokerage commissions) of all shares purchased by the Agent will be the price per share allocable to each participant. The Agent will generally complete these open-market purchases within five business days following the payment date. If, before the Agent has completed open-market purchases, the market price per share (plus estimated brokerage commissions) rises to exceed the net asset value per share on the payment date, then the purchase price may exceed the net asset value per share, potentially resulting in the acquisition of fewer shares than if the distribution had been paid in newly issued shares.

How to withdraw from a Plan Participants may withdraw from a Fund's Plan at any time by notifying the Agent, either in writing or by telephone. Such withdrawal will be effective immediately if notice is received by the Agent with sufficient time prior to any distribution record date; otherwise, such withdrawal will be effective with respect to any subsequent distribution following notice of withdrawal.

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There is no penalty for withdrawing from or not participating in a Plan.

Plan administration The Agent will credit all shares acquired for a participant under a Plan to the account in which the participant's common shares are held. Each participant will be sent reasonably promptly a confirmation by the Agent of each acquisition made for his or her account.

About brokerage fees Each participant pays a proportionate share of any brokerage commissions incurred if the Agent purchases additional shares on the open market, in accordance with the Plans. There are no brokerage charges applied to shares issued directly by the Funds under the Plans.

About taxes and Plan amendments Reinvesting dividend and capital gain distributions in shares of the Funds does not relieve you of tax obligations, which are the same as if you had received cash distributions. The Agent supplies tax information to you and to the IRS annually. Each Fund reserves the right to amend or terminate its Plan upon 30 days' written notice. However, the Agent may assign its rights, and delegate its duties, to a successor agent with the prior consent of a Fund and without prior notice to Plan participants.

If your shares are held in a broker or nominee name If your shares are held in the name of a broker or nominee offering a dividend reinvestment service, consult your broker or nominee to ensure that an appropriate election is made on your behalf. If the broker or nominee holding your shares does not provide a reinvestment service, you may need to register your shares in your own name in order to participate in a Plan.

In the case of record shareholders such as banks, brokers or nominees that hold shares for others who are the beneficial owners of such shares, the Agent will administer the Plan on the basis of the number of shares certified by the record shareholder as representing the total amount registered in such shareholder's name and held for the account of beneficial owners who are to participate in the Plan.

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Financial statements

These sections of the report, as well as the accompanying Notes, preceded by the Report of Independent Registered Public Accounting Firm, constitute the fund's financial statements.

The fund's portfolio lists all the fund's investments and their values as of the last day of the reporting period. Holdings are organized by asset type and industry sector, country, or state to show areas of concentration and diversification.

Statement of assets and liabilities shows how the fund's net assets and share price are determined. All investment and non-investment assets are added together. Any unpaid expenses and other liabilities are subtracted from this total. The result is divided by the number of shares to determine the net asset value per share. (For funds with preferred shares, the amount subtracted from total assets includes the liquidation preference of preferred shares.)

Statement of operations shows the fund's net investment gain or loss. This is done by first adding up all the fund's earnings — from dividends and interest income — and subtracting its operating expenses to determine net investment income (or loss). Then, any net gain or loss the fund realized on the sales of its holdings — as well as any unrealized gains or losses over the period — is added to or subtracted from the net investment result to determine the fund's net gain or loss for the fiscal period.

Statement of changes in net assets shows how the fund's net assets were affected by the fund's net investment gain or loss, by distributions to shareholders, and by changes in the number of the fund's shares. It lists distributions and their sources (net investment income or realized capital gains) over the current reporting period and the most recent fiscal year-end. The distributions listed here may not match the sources listed in the Statement of operations because the distributions are determined on a tax basis and may be paid in a different period from the one in which they were earned. Dividend sources are estimated at the time of declaration. Actual results may vary. Any non-taxable return of capital cannot be determined until final tax calculations are completed after the end of the fund's fiscal year.

Financial highlights provide an overview of the fund's investment results, per-share distributions, expense ratios, net investment income ratios, and portfolio turnover in one summary table, reflecting the five most recent reporting periods. In a semiannual report, the highlights table also includes the current reporting period.

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Report of Independent Registered Public Accounting Firm

To the Trustees and Shareholders of
Putnam Municipal Opportunities Trust:

In our opinion, the accompanying statement of assets and liabilities, including the portfolio, and the related statements of operations and of changes in net assets and the financial highlights present fairly, in all material respects, the financial position of Putnam Municipal Opportunities Trust (the "fund") at April 30, 2013, and the results of its operations, the changes in its net assets and the financial highlights for each of the periods indicated, in conformity with accounting principles generally accepted in the United States of America. These financial statements and financial highlights (hereafter referred to as "financial statements") are the responsibility of the fund's management. Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits of these financial statements in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing

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the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits, which included confirmation of investments owned at April 30, 2013 by correspondence with the custodian and brokers, provide a reasonable basis for our opinion.

PricewaterhouseCoopers LLP
 Boston, Massachusetts
 June 18, 2013

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The fund's portfolio 4/30/13

Key to holding's abbreviations

ABAG Association Of Bay Area Governments	FRB Floating Rate Bonds: the rate shown is the current interest rate at the close of the reporting period
AGM Assured Guaranty Municipal Corporation	
AGO Assured Guaranty, Ltd.	G.O. Bonds General Obligation Bonds
AMBAC AMBAC Indemnity Corporation	NATL National Public Finance Guarantee Corp.
COP Certificates of Participation	SGI Syncora Guarantee, Inc.
FGIC Financial Guaranty Insurance Company	U.S. Govt. Coll. U.S. Government Collateralized
FHLMC Coll. Federal Home Loan Mortgage Corporation Collateralized	VRDN Variable Rate Demand Notes, which are floating-rate securities with long-term maturities, that carry coupons that reset every one or seven days. The rate shown is the current interest rate at the close of the reporting period.
FNMA Coll. Federal National Mortgage Association Collateralized	

MUNICIPAL BONDS AND NOTES (136.7%)*	Rating**	Principal amount	Value
Alabama (0.1%)			
Selma, Indl. Dev. Board Rev. Bonds (Gulf Opportunity Zone Intl. Paper Co.), Ser. A, 5.8s, 5/1/34	BBB	\$750,000	\$845,295
			845,295
Arizona (3.9%)			
Casa Grande, Indl. Dev. Auth. Rev. Bonds (Casa Grande Regl. Med. Ctr.), Ser. A, 7 5/8s, 12/1/29	BB-/P	3,025,000	3,109,609

Cochise Cnty., Indl. Dev. Auth. Rev. Bonds (Sierra

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Vista Cmnty. Hosp.), Ser. A, 6 3/4s, 12/1/26	BBB+/P	380,000	380,745
Coconino Cnty., Poll. Control Rev. Bonds (Tucson Elec. Pwr. Co. — Navajo), Ser. A, 5 1/8s, 10/1/32	Baa3	1,500,000	1,598,040
Glendale, Indl. Dev. Auth. Rev. Bonds (Midwestern U.), 5 1/8s, 5/15/40	A-	2,125,000	2,297,316
Maricopa Cnty., Poll. Control Rev. Bonds (El Paso Elec. Co.), Ser. A, 7 1/4s, 2/1/40	Baa2	2,400,000	2,835,720
Phoenix, Civic Impt. Corp. Arpt. Rev. Bonds Ser. A, 5s, 7/1/40	A1	1,000,000	1,107,590
(Sr. Lien), 5s, 7/1/32	Aa3	1,000,000	1,141,070
(Sr. Lien), 5s, 7/1/31	Aa3	1,735,000	1,997,506
Pima Cnty., Indl. Dev. Auth. Rev. Bonds (Tucson Elec. Pwr. Co.), 5 3/4s, 9/1/29	Baa3	800,000	842,088
(Horizon Cmnty. Learning Ctr.), 5.05s, 6/1/25	BBB	1,550,000	1,549,938
Pinal Cnty., Elec. Rev. Bonds (Dist. No. 3), 5 1/4s, 7/1/36	A	500,000	554,510
Salt River Agricultural Impt. & Pwr. Dist. Rev. Bonds, Ser. A, 5s, 12/1/31	Aa1	3,000,000	3,554,819
Tempe, Indl. Dev. Auth. Lease Rev. Bonds (ASU Foundation), AMBAC, 5s, 7/1/28	AA/P	500,000	500,990
U. Med. Ctr. Corp. AZ Hosp. Rev. Bonds, 6 1/2s, 7/1/39	Baa1	1,000,000	1,163,110
			22,633,051

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MUNICIPAL BONDS AND NOTES (136.7%)* cont.	Rating**	Principal amount	Value
California (27.6%)			
ABAG Fin. Auth. for Nonprofit Corps. Rev. Bonds (Episcopal Sr. Cmnty.), Ser. A, 5s, 7/1/32	BBB	\$550,000	\$604,654

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ABC Unified School Dist. G.O. Bonds, Ser. B, FGIC, zero %, 8/1/20	Aa3	1,500,000	1,257,405
Alameda, Corridor Trans. Auth. Rev. Bonds (Sr. Lien), Ser. A, 5s, 10/1/29	AA-	1,250,000	1,467,213
Bay Area Toll Auth. of CA Rev. Bonds (San Francisco Bay Area), Ser. F-1, 5s, 4/1/39	AA	2,500,000	2,796,925
Burbank, Unified School Dist. G.O. Bonds (Election of 1997), Ser. C, NATL, FGIC, zero %, 8/1/23	AA-	1,000,000	712,240
CA Edl. Fac. Auth. Rev. Bonds (Claremont Graduate U.), Ser. A, 5s, 3/1/42	A3	2,000,000	2,103,580
(U. of the Pacific), 5s, 11/1/21	A2	1,500,000	1,642,380
(Loyola-Marymount U.), NATL, zero %, 10/1/21	A2	1,300,000	997,828
CA Hsg. Fin. Agcy. Rev. Bonds (Home Mtge.) Ser. E, 4.8s, 8/1/37	Baa2	5,000,000	4,887,500
Ser. K, 4 5/8s, 8/1/26	Baa2	2,500,000	2,476,650
CA Muni. Fin. Auth. COP (Cmnty. Hosp. Central CA), 5 1/4s, 2/1/37	Baa2	1,800,000	1,896,624
CA Muni. Fin. Auth. Rev. Bonds (Biola U.), 5s, 10/1/42	Baa1	500,000	544,440
CA Poll. Control Fin. Auth. Rev. Bonds (San Jose Wtr. Co.), 5.1s, 6/1/40	A	3,500,000	3,836,805
(Pacific Gas & Electric Corp.), Class D, FGIC, 4 3/4s, 12/1/23	A3	2,500,000	2,749,350
CA Poll. Control Fin. Auth. Solid Waste Disp. FRB (Waste Management, Inc.), Ser. C, 5 1/8s, 11/1/23	BBB	850,000	925,234
CA Poll. Control Fin. Auth. Wtr. Fac. Rev. Bonds (American Wtr. Cap. Corp.), 5 1/4s, 8/1/40	BBB+	1,000,000	1,079,840
CA State G.O. Bonds 6 1/2s, 4/1/33	A1	12,000,000	14,905,320
5 1/2s, 3/1/40	A1	7,450,000	8,824,078
5s, 4/1/42	A1	4,000,000	4,468,800
5s, 10/1/29	A1	3,000,000	3,476,340

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CA State Pub. Wks. Board Rev. Bonds			
Ser. I-1, 6 1/8s, 11/1/29	A2	1,000,000	1,244,540
Ser. A-1, 6s, 3/1/35	A2	1,600,000	1,946,080
(Dept. of Forestry & Fire), Ser. E, 5s, 11/1/32	A2	1,575,000	1,718,987
(Capital Projects), Ser. A, 5s, 4/1/29	A2	2,000,000	2,260,580

CA Statewide Cmnty. Dev. Auth. COP (The			
Internext Group), 5 3/8s, 4/1/30	BBB	5,250,000	5,266,905

CA Statewide Cmnty