As filed with the Securities and Exchange Commission on December 22, 2011 Registration No. 333-

UNITED STATES SECURITIES AND EXCHANGE COMMISSION Washington, D.C. 20549

FORM S-3 REGISTRATION STATEMENT UNDER THE SECURITIES ACT OF 1933 MIDSOUTH BANCORP, INC. (Exact name of registrant as specified in its charter)

Louisiana (State or other jurisdiction of incorporation or organization) 72-1020809 (I.R.S. Employer Identification Number)

102 Versailles Boulevard Lafayette, LA 10501 (337) 237-8343 (Address including zip code, and telephone number, including area code, of registrant's principal executive offices) C. R. Cloutier President and Chief Executive Officer MidSouth Bancorp, Inc. 102 Versailles Boulevard Lafayette, LA 10501 (337) 237-8343 (Name, address, including zip code, and telephone number, including area code, of agent for service)

Copies to: Thomas O. Powell, Esq. Patrick W. Macken, Esq. Troutman Sanders LLP 600 Peachtree Street, N.E. Suite 5200 Atlanta, GA 30308 (404) 885-3000

Approximate date of commencement of proposed sale to the public: From time to time after the effective date of this registration statement.

If the only securities being registered on this Form are being offered pursuant to dividend or interest reinvestment plans, please check the following box. x

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, other than securities offered only in connection with dividend or interest reinvestment plans, check the following box. o

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

If this Form is a registration statement pursuant to General Instruction I.D. or a post-effective amendment thereto that shall become effective upon filing with the Commission pursuant to Rule 462(e) under the Securities Act, check the following box: o

If this Form is a post-effective amendment to a registration statement filed pursuant to General Instruction I.D. filed to register additional securities or additional classes of securities pursuant to Rule 413(b) under the Securities Act, check the following box: o

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer o

Accelerated filer x

Non-accelerated filer o (Do not check if a smaller reporting company)

CALCULATION OF REGISTRATION FEE

Smaller reporting company o

| | | Proposed | Proposed | |
|------------------------|------------|-------------|------------------|--------------|
| | | Maximum | Maximum | |
| Title of Each Class of | Amount to | Offering | Aggregate | Amount of |
| Securities to be | be | Price per | Offering | Registration |
| Registered | Registered | Unit | Price | Fee |
| Common Stock, par | 900,000 | | | |
| value \$0.10 per share | (1) | \$13.23 (2) | \$11,907,000 (2) | \$1,364.55 |

(1) The shares may be sold, from time to time, by the registrant, pursuant to the MidSouth Bancorp, Inc. Dividend Reinvestment and Stock Purchase Plan. This Registration Statement shall also cover any additional shares of common stock which become issuable under the MidSouth Bancorp, Inc. Dividend Reinvestment and Stock Purchase Plan by reason of any stock dividend, stock split, recapitalization or other similar transaction effected without the receipt of consideration which results in an increase in the number of common shares.

(2) Estimated solely for purposes of calculating the registration fee pursuant to Rule 457(c) under the Securities Act of 1933, as amended, based upon the average of the high and low reported sales prices for our common stock, as reported on the NYSE Amex Equities on December 19, 2011, which was within five business days prior to the date of filing of the Registration Statement. The proposed maximum offering price per share will be determined, from time to time, by the registrant in connection with the issuance by the registrant of the securities registered.

The registrant hereby amends this registration statement on such date or dates as may be necessary to delay its effective date until the registrant shall file a further amendment which specifically states that this registration statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933 or until the

registration statement shall become effective on such date as the Commission acting pursuant to said Section 8(a), may determine.

The information in this prospectus is not complete and may be changed. The selling securityholders may not sell any of the securities described in this prospectus until the registration statement that we have filed to cover the securities has become effective under the rules of the Securities and Exchange Commission. This prospectus is not an offer to sell the securities, nor is it a solicitation of an offer to buy the securities, in any jurisdiction where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED DECEMBER 22, 2011

PROSPECTUS

MidSouth Bancorp, Inc. Dividend Reinvestment and Stock Purchase Plan

This prospectus relates to 900,000 shares of common stock that we may offer and sell from time to time according to the terms of the MidSouth Bancorp, Inc. Dividend Reinvestment and Stock Purchase Plan (the "Plan"). The Plan is effective , 2011 and replaces the former MidSouth Bancorp, Inc. Dividend Reinvestment and Stock Purchase Plan. Participants in the former MidSouth Bancorp, Inc. Dividend Reinvestment and Stock Purchase Plan are automatically enrolled as participants in the Plan. Participants should retain this prospectus for future reference.

The Plan provides participants with a convenient and economical means of purchasing shares of our common stock by reinvesting the cash dividends paid on our common stock and by making additional optional cash purchases. In addition, new investors may make their initial investment in our common stock under the Plan. The minimum purchase for both initial and subsequent optional cash purchases is \$1,000. The maximum limit for both initial and optional cash purchases is \$10,000 per month, unless we grant a waiver of this amount. This prospectus describes and constitutes the Plan.

Shares of common stock will be (i) purchased on the open market or (ii) purchased directly from us from authorized but unissued shares or from treasury shares.

We have appointed The Bank of New York Mellon (the "Plan Administrator") to serve as the administrator of the Plan, with certain administrative support provided by its affiliate, BNY Mellon Shareowner Services. You may enroll in the Plan through the Plan Administrator's website (www.bnymellon.com/shareowner/equityaccess) by clicking on Investor ServiceDirect®, or by calling 1-888-216-8113 toll free and responding to the appropriate prompts. You may also enroll in the Plan by completing an enrollment form and returning it to the Plan Administrator.

Investing in our common stock involves certain risks. Please refer to "Risk Factors" beginning on page 3 of this prospectus.

Our common stock is listed on the NYSE Amex Equities under the symbol "MSL."

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

The shares offered are our equity securities and are not savings accounts, deposits, or other obligations of any bank subsidiary of ours and are not insured by the Federal Deposit Insurance Corporation, the Deposit Insurance Fund, or any other governmental agency.

We have not authorized anyone to provide you with information that is different from what is contained in or incorporated by reference into this prospectus. The Plan is not available to any person to whom we may not legally offer it. You should not assume that the information in this prospectus is still accurate as of any date later than the date of this prospectus.

The date of this prospectus is , 2011.

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement that we have filed with the Securities and Exchange Commission (the "SEC") relating to the shares of our common stock to be offered and sold pursuant to the Plan. This prospectus, which does not include all of the information in the registration statement, provides you with a general description of the Plan and the securities offered under the Plan. The registration statement containing this prospectus, including exhibits to the registration statement, provides additional information about us, the Plan, and the securities offered. The registration statement can be read at the SEC web site or at the SEC offices mentioned under the heading "Where You Can Find More Information."

When acquiring any securities discussed in this prospectus, you should rely only on the information provided in this prospectus, including the information incorporated by reference. We have not authorized anyone to provide you with different information. We are not offering the securities in any state or jurisdiction where the offer is prohibited. You should not assume that the information in this prospectus or any document incorporated by reference is accurate or complete at any date other than the date indicated on the cover page of this document.

Unless otherwise stated or the context requires otherwise, all references in this prospectus to "MSL," "we," "us," "our," or similar references mean MidSouth Bancorp, Inc. and its consolidated subsidiaries.

FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference herein contain statements that are considered "forward looking statements" within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934 and subject to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995, which involve risks and uncertainties. In addition, the Company and its management may make other written or oral communications from time to time that contain forward-looking statements. The words "anticipate," "believe," "estimate," "expect," "intend," "may," "plan," "could," "would," "should," "potential," "forecast" and similar expressions are to identify forward-looking statements. These statements include, among others, statements regarding:

future results; improvements in classified and criticized assets; the integration of operations from recently completed acquisitions; changes in the local and national economy; the work-out of nonaccrual loans; the competition for other potential acquisitions; and the impact of regulatory changes regarding electronic transactions.

Actual results may differ materially from the results anticipated in these forward-looking statements. Factors that might cause such a difference include, among other matters:

changes in interest rates and market prices that could affect the net interest margin, asset valuation, and expense levels;

changes in local economic and business conditions, including, without limitation, changes related to the oil and gas industries, that could adversely affect customers and their ability to repay borrowings under agreed upon terms, adversely affect the value of the underlying collateral related to their borrowings, and reduce demand for loans; the timing and ability to reach any agreement to restructure nonaccrual loans;

increased competition for deposits and loans which could affect compositions, rates and terms;

receipt of necessary approvals for proposed acquisitions, the success or failure of integrating operations of recently completed and proposed acquisitions, the timing and impact of future acquisitions, and the ability to capitalize on growth opportunities upon entering new markets;

loss of critical personnel and the challenge of hiring qualified personnel at reasonable compensation levels; legislative and regulatory changes, including the impact of regulations under the Dodd-Frank Wall Street Reform and Consumer Protections Act of 2010 (the "Dodd-Frank Act") and other changes in banking, securities and tax laws and regulations and their application by our regulators, and changes in the scope and cost of FDIC insurance and other coverages; and

other factors discussed under the heading "Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2010 filed with the SEC on March 16, 2011 and in our other filings with the SEC.

We can give no assurance that any of the events anticipated by the forward-looking statements will occur or, if any of them does, what impact they will have on our results of operations and financial condition. We disclaim any intent or obligation to publicly update or revise any forward-looking statements, regardless of whether new information becomes available, future developments occur or otherwise.

MIDSOUTH BANCORP, INC.

MidSouth Bancorp, Inc. is a bank holding company headquartered in Lafayette, Louisiana with assets of \$1.2 billion as of September 30, 2011. Through our wholly owned subsidiary, MidSouth Bank, N.A., we offer a full range of banking services to commercial and retail customers in south Louisiana and southeast Texas. MidSouth Bank has 39 locations in Louisiana and Texas and is connected to a worldwide ATM network that provides customers with access to more than 43,000 surcharge-free ATMs. MidSouth Bank is community oriented and focuses primarily on offering commercial and consumer loan and deposit services to individuals, and small and middle market businesses.

Additional corporate information about us and our bank subsidiaries is available at our website, www.midsouthbank.com. The information included on our website is not incorporated into this prospectus.

Our common stock is listed on the NYSE Amex Equities under the symbol "MSL." Our main office is located at 102 Versailles Blvd., Lafayette, Louisiana 70501 and our telephone number is (337) 237-8343.

RISK FACTORS

There are risks and uncertainties involved with an investment in shares of our common stock. In addition to the risks described below, please see the "Risk Factors" section of our annual reports on Form 10-K and quarterly reports on Form 10-Q, which we file with the SEC and incorporate by reference into this prospectus, for a discussion of the factors that you should consider in connection with an investment in shares of our common stock. We encourage you to read these risk factors, including those incorporated by reference, in their entirety, in addition to the following risk described below:

Participants are subject to the risk of market fluctuations because they will not have the ability to direct the price or timing of purchases under the Plan.

You do not have control or authority to direct the price or time at which common stock is purchased or sold for Plan accounts. Therefore, you bear the market risk associated with fluctuations in the price of common stock. The Plan does not represent a change in our dividend policy which will continue to depend upon earnings, financial and regulatory requirements and other factors, and which will be determined by our Board of Directors from time to time.

Additional risks and uncertainties not presently known to us or that we currently deem immaterial may also adversely affect our business operations and financial condition. Such risks could cause actual results to differ materially from anticipated results. This could cause the trading price of our common stock to decline, perhaps significantly, and you may lose part or all of your investment.

USE OF PROCEEDS

To the extent that shares of common stock used to fund the Plan are purchased on the open market, there will be no proceeds to us from the purchase of those shares. The net proceeds to us from the sale of newly issued shares of common stock issued under the Plan will be used for general corporate purposes, which may include direct investments by us; investments in, or extensions of credit to, our banking subsidiaries; and funding possible acquisitions. The precise amounts and timing of the application of net proceeds will depend upon our funding requirements and the availability of other funds.

DESCRIPTION OF OUR DIVIDEND REINVESTMENT AND STOCK PURCHASE PLAN

The following questions and answers explain and constitute the Plan. This Plan replaces the former MidSouth Bancorp, Inc. Dividend Reinvestment and Stock Purchase Plan and this prospectus constitutes notice of termination of the former plan. If you participated in the former plan at the time of the Plan's adoption, then you automatically are a participant in this Plan in the same manner, and to the same extent, as you participated in the former plan, unless you elect to terminate your participation in this Plan or wish to change your participation in some way (e.g., opt for partial reinvestment rather than full reinvestment of your MSL dividends).

PURPOSE

1. What is the purpose of the Plan?

The purpose of the Plan is to provide both our existing shareholders and new investors with a simple, convenient, and economical means of purchasing shares of our common stock, including through new cash payments and the reinvestment of dividends on shares held in your Plan account. The Plan also provides us with an economical and flexible mechanism to raise equity capital through sales of our common stock.

ADVANTAGES AND DISADVANTAGES

2. What are the advantages of participation in the Plan?

You do not need to be a current shareholder, nor do you need to have a broker, to buy our common stock through the Plan.

You can start investing with a relatively small amount of money, or with a single larger investment—whichever you prefer.

You may send a check to the Plan Administrator or arrange for funds to be deducted from your savings or checking account.

Dividends and optional cash purchases can be fully invested in additional shares of our common stock because the Plan permits fractional shares to be credited to your account. Dividends on fractional shares may also be reinvested in additional shares.

There are no transaction or trading fees when shares are purchased through the Plan. The entire amount of your dividend and/or optional cash will be used to purchase our common stock. If you are already a shareholder, you can consolidate all your holdings of our common stock into a single account. You can deposit your stock certificates into your Plan account or, if you hold shares with a broker, you can transfer those shares into your own name and deposit them into your Plan account.

The Plan offers you flexibility when you decide to sell your shares. You may request the sale of some or all of your shares through the Plan Administrator at any time. Or, if you prefer to have complete control over the timing and price at which you sell, you may withdraw your shares from the Plan, at no cost to you, and sell them through a broker of your choice.

3. What are the disadvantages of participation in the Plan?

Because the prices at which shares are purchased are determined as of specified dates or as of dates otherwise beyond your control, you may lose some advantages otherwise available to you in being able to select the timing of your investments. For example, because the price charged to you for shares purchased on the open market is the average price paid by the Plan Administrator to obtain shares for all participants who acquire shares through the Plan on the same day, you may pay a higher price for shares purchased under the Plan than for shares purchased on the investment date outside of the Plan.

We will not pay interest on funds we hold pending investment.

Sales of shares for participants are irrevocable and will be made at market prices at the time of sale. You will not be able to control the timing of such sales or to place "limit orders" specifying the prices at which you are willing to sell your shares.

To sell your shares through a broker of your choice, you must first arrange to obtain a physical stock certificate from the Plan Administrator and have the certificate delivered to you, or ask the Plan Administrator to transfer shares held for you in the Plan directly to your broker. The Plan Administrator will promptly process your instructions, but you should leave ample time for preparation and receipt of your stock certificate if you decide to go that route.

Shares held in the Plan by the Plan Administrator are not covered by the customer protection provisions of the Securities Investor Protection Act of 1970 relating to customers of failed securities broker-dealer firms.

ADMINISTRATION

4. Who administers the Plan for participants?

The Plan is administered by The Bank of New York Mellon, a corporation independent of, and not affiliated with, us. The Plan Administrator, along with its affiliate, BNY Mellon Shareowner Services, maintains records, prepares, and sends account statements to participants, and performs other duties related to the Plan.

PARTICIPATION

5. Who is eligible to participate in the Plan?

Any person or legal entity is eligible to participate in the Plan. You do not have to be a current shareholder, nor do you have to reside or be located in the U.S. or be a U.S. citizen. However, you must become a shareholder of record in order to participate in the dividend reinvestment component of the Plan. In all cases, optional cash purchases of shares through the plan must be made in U.S. currency drawn on a U.S. bank. In addition, before investing in our common stock, each participant who resides or is located outside the U.S. is responsible for reviewing the laws of his or her country of residence or other applicable laws to determine if there are any restrictions on his or her ability to invest through the Plan.

4

6. How can I participate in the Plan?

Eligible shareholders as well as new investors can enroll either by going to the Plan Administrator's web site, using their automated voice response system, or requesting and returning an enrollment form by mail. Please refer to Question 37 for the Plan Administrator's web site, phone numbers, and addresses.

DIVIDEND REINVESTMENT

7. How does the reinvestment process work?

As a participant in the Plan, you may elect to reinvest all, part, or none of the dividends paid on your MSL common stock, and your preference should be indicated on the enrollment form. If you complete and return an enrollment form without selecting one of these three options, all of your dividends will be automatically reinvested in shares of MSL.

Full dividend reinvestment: If you select this option, all of the cash dividends paid on the shares you enroll in the Plan will automatically be reinvested to purchase additional shares of MSL stock.

Partial dividend reinvestment: If you select this option, a portion of your cash dividends will be paid to you in cash, and the remaining portion of your dividends will be automatically reinvested to purchase additional shares of MSL stock. If you choose partial reinvestment, you must specify on the enrollment form the percentage on which you wish to continue to receive cash dividends by check or to have directly deposited into your designated checking or savings account, as further described below. The remaining dividends will be automatically reinvested.

No dividend reinvestment: If you select this option, all of your dividends will be paid to you in cash. You may choose to have your cash dividends directly deposited into your designated checking or savings account or sent to you by check.

To arrange to have your dividends directly deposited into your designated bank account, you must complete the appropriate section on the enrollment form and return it to the Plan Administrator. You may request an enrollment form by calling the Plan Administrator at 1-888-216-8113, or you may authorize the direct deposit of dividends when you enroll in the Plan online, or access your account online at www.bnymellon.com/shareowner/equityaccess.

8. When will the reinvestment of my dividends begin?

Typically, we pay a quarterly cash dividend on or about the 1st day of January, April, July, and October to shareholders of record on or about the 15th day of the previous months. The reinvestment of your dividends will begin with the first quarterly cash dividend that we pay following your enrollment, but only if your enrollment is received by the record date for that dividend. If your enrollment is received between a record date and a payable date, the reinvestment of your dividends will commence with the dividend payment in the following quarter.

9. Can I deposit stock certificates for safekeeping with the Plan Administrator?

You may deposit any or all of your MSL stock certificates with the Plan Administrator for safekeeping. This added feature relieves you of the worry associated with the possibility of loss, theft, or destruction of the certificates. This

service is provided to Plan participants without charge.

INITIAL AND OPTIONAL CASH PURCHASES

10. When and how can I make initial or optional cash purchases?

New investors may make an initial cash purchase when enrolling in the Plan by enclosing a check with their enrollment form, or by authorizing an automatic debit from a designated bank account when enrolling online at the Plan Administrator's website. In both cases, the minimum initial cash purchase amount is \$1,000.

As a Plan participant, you may also make optional cash purchases of our common stock. The minimum cash purchase accepted per transaction is \$100 (\$40 for employees of MSL), and you may make purchases up to a maximum of \$10,000 per calendar month unless we grant you a waiver of this amount. The Plan Administrator will make arrangements to use initial and optional cash investments to purchase MSL shares as promptly as practicable, usually within five (5) business days upon receipt of funds by the Plan Administrator.

Your cash purchases may be commingled by the Plan Administrator with dividends and with other participants' cash purchases for the purpose of buying shares of common stock. You cannot specify the prices or timing of purchases, nor can you make any other limitations on the purchase of shares other than those specified under these terms and conditions. No interest will be paid on optional cash purchases pending investment.

If you choose to submit a check, be sure to use the contribution form that appears on your Plan statement, and mail it to the address specified on the form. Alternatively, if you wish to make regular monthly purchases, you may authorize automatic deductions from your bank account. This feature enables you to make ongoing investments in an amount that is comfortable for you, without having to write a check. You also may authorize individual debits from your bank account.

11. Am I obligated to make cash purchases if I enroll in the Plan?

No. Cash purchases are entirely voluntary. You may supplement the reinvestment of your dividends with optional cash purchases as often as you like, or not at all. Or you may buy shares with optional cash purchases and choose not to reinvest any or all of your dividends.

FEES

12. What fees may I incur by participating in the Plan?

We will pay all service and trading fees associated with the reinvestment of dividends and initial and optional cash purchases.

A \$15.00 transaction fee, plus a trading fee of \$0.12 per share, will be charged each time Plan shares are sold on your behalf. There will also be a \$35 charge for any returned check or debit. These fees may change from time to time, without prior written notice.

PURCHASE OF SHARES

13. What is the source of the common stock that may be purchased through the Plan?

At our discretion, share purchases will be made on the open market or directly from MSL. Shares purchased from MSL may come from our authorized but unissued shares or from our treasury shares. Share purchases on the open market may be made on any stock exchange where our common stock is traded or through negotiated transactions, on

such terms as the Plan Administrator determines. Neither we nor you will have any authority to direct the date, time, or price at which shares may be purchased by the Plan Administrator.

14. How will shares be purchased under the Plan?

Upon receipt of your funds, the Plan Administrator will invest initial and additional cash purchases as promptly as practicable, normally within five (5) business days.

Shares will be posted to your account in whole and fractional shares, computed to four decimal places. A confirmation of your transaction will be sent by e-mail or via a paper statement to the Internet or postal address you give us when you enroll in the Plan.

In the unlikely event that, due to unusual market conditions, the Plan Administrator is unable to invest the funds within thirty-five (35) calendar days, the Plan Administrator will return the funds to you by check. No interest will be paid on funds held by the Plan Administrator pending investment.

For automatic monthly purchases, the amounts you have authorized will be withdrawn from your bank account on the 15th day of each month or on the next succeeding business day if the 15th falls on a weekend or holiday. The funds will be credited to your Plan account and normally invested within five (5) business days after receipt by the Plan Administrator.

The Plan Administrator will use your cash to purchase as many full and fractional shares as possible.

15. How will the price for my shares be determined?

For shares purchased on the open market, the purchase price will be the average price that the Plan Administrator pays to obtain shares for all participants who acquire shares through the Plan on the same day. For shares purchased directly from MSL, the purchase price will be 100% of the volume-weighted average price of our common stock, as reported in the NYSE Amex Equities Composite Transactions listing, on the investment date, less any discount that we may decide to offer.

16. Will shares be offered to Plan participants at a discount?

We will establish a waiver discount only for shares that are purchased directly from us pursuant to a waiver request. For each pricing period, we may establish a discount from the market price applicable to optional cash purchases and initial investments made pursuant to a request for waiver (please see Question 17). This waiver discount, if any, will range from 0% to 5% of the purchase price and may vary for each pricing period. The waiver discount, if any, will be established at our sole discretion after a review of current market conditions, the level of participation in the Plan, the attractiveness of obtaining additional funds through the sale of our common shares as compared to other sources of funds, and our need for additional funds. You may obtain information regarding the maximum waiver discount, if any, by contacting the Plan Administrator at (201) 680-5300 or waivers@bnymellon.com. Setting a waiver discount for a particular pricing period will not affect the setting of a waiver discount for any subsequent pricing period. The waiver discount, if any, will apply only to optional cash purchases and initial investments in excess of \$120,000. The waiver discount, if any, will apply to the entire optional cash purchase or initial investment made pursuant to a waiver and not just the portion in excess of \$120,000.

17. May I invest more than the Plan maximum of \$120,000 per account per year?

Yes, if you request a waiver of this limit and we grant your waiver request. Upon receipt of a written waiver form from an investor, we will consider waiving the maximum investment limit. Grants of waiver requests will be made in our sole discretion based on a variety of factors, which may include: our current and projected capital needs, prevailing market prices of our common stock and other securities, and general economic and market conditions.

Shares purchased in excess of the Plan maximum investment amount will be priced as follows:

Investments for which a waiver has been granted will be made subject to a "pricing period," which will generally consist of one (1) to fifteen (15) separate days during which trading of our common stock is reported on the NYSE Amex Equities. Each of these separate days will be an "investment date," and an equal proportion of the investment amount will be invested on each trading day during such pricing period, subject to the qualifications listed below. The purchase price for shares acquired on a particular investment date will be equal to 100% (subject to change as provided below) of the volume-weighted average price (less any applicable discount), rounded to four decimal places, of our common stock as reported by the NYSE Amex Equities only, obtained from Bloomberg, LP for the trading hours from 9:30 a.m. to 4:00 p.m., Eastern Time, for that investment date. Funds for such investments must be received by the Plan Administrator not later than the business day before the first day of the pricing period.

We may establish a minimum, or "threshold," price for any pricing period that the volume-weighted average price, rounded to four decimal places, of our common stock must equal or exceed during each trading day of the pricing period for investments made pursuant to a waiver request.

If we decide to establish a threshold price for a particular pricing period, the threshold price for any investments made pursuant to a request for waiver will be a stated dollar amount that the volume-weighted average price, rounded to four decimal places, of our common stock, as reported by the NYSE Amex Equities for each trading day in the relevant pricing period, must equal or exceed. If the threshold price is not satisfied for a trading day in the pricing period, then that trading day and the trading prices for that day will be excluded from the pricing period.

We will only establish a threshold price if shares will be purchased directly from us in connection with the relevant pricing period (please see first bullet above). If we have established a threshold price with respect to the relevant pricing period, then we will exclude from the pricing period any trading day that the volume-weighted average price is less than the threshold price and refund that day's proportional investment amount. For example, if the threshold price is not met for two (2) of the trading days in a ten-day pricing period, then we will return 20% of the funds you submitted in connection with your waiver request, without interest, unless we have activated the pricing period extension feature for the pricing period, as described below.

Neither we nor the Plan Administrator are required to notify you that a threshold price has been established for any pricing period.

We may elect to activate for any particular pricing period a pricing period extension feature which will provide that the initial pricing period be extended by the number of days that the threshold price is not satisfied, subject to a maximum of five (5) trading days. If we elect to activate the

pricing period extension feature and the threshold price is satisfied for any additional day that has been added to the initial pricing period, that day will be included as one of the trading days for the pricing period instead of the day on which the threshold price was not met. For example, if the determined pricing period is ten (10) days, and the threshold price is not satisfied for three (3) out of those ten (10) days in the initial pricing period, and we had previously announced in the bid-waiver form that the pricing period extension feature was activated, then the pricing period will be automatically extended, and if the threshold price is satisfied on the next three (3) trading days (or a subset thereof), then those three (3) days (or subset thereof) will become investment dates in lieu of the three were ten (10) trading days during the initial and extended pricing period on which the threshold price was satisfied, all of the funds that you include with your request for waiver will be invested.

Newly issued shares purchased pursuant to a request for waiver will be posted to participants' accounts within three (3) business days following the end of the applicable pricing period, or, if we elect to activate the continuous settlement feature, within three (3) business days of each separate investment date beginning on the first investment date in the relevant pricing period and ending on the final investment date in the relevant pricing period, with an equal amount being invested on each day, subject to the qualifications set forth above. During any month when we are proposing to grant requests for waiver for one or more investments, we may elect to activate the continuous settlement feature for such investments by announcing in the bid-waiver form that we will be doing so. The purchase price of shares acquired on each investment date will be equal to the volume-weighted average price obtained from Bloomberg, LP (unless such service is unavailable, in which case we will designate another service to be utilized before the beginning of the pricing period), rounded to four decimal places, for the trading hours from 9:30 a.m. to 4:00 p.m., Eastern Time, for each of the investment dates during the pricing period, assuming the threshold price is met on that day, less any discount that we may decide to offer. For each pricing period (assuming the threshold price is met on each trading day of that pricing period), we would have a separate settlement of each investment dates' purchases, each based on the volume-weighted average price for the trading day relating to each of the investment dates during the pricing period.

Waiver request forms and information regarding the establishment of a threshold price, if any, may be obtained by contacting the Plan Administrator at (201) 680-5300 or waivers@bnymellon.com.

SALE OF PLAN SHARES

18. How can I sell the shares of common stock that are held in my Plan account?

You may request that the Plan Administrator sell some or all of the shares held in your Plan account. The Plan Administrator will aggregate all shares for which requests to sell were received and will sell the whole shares on the open market through a registered broker-dealer selected at its sole discretion. In such event, you will receive proceeds based on the average sale price of all shares sold, less a transaction fee of \$15.00, plus a trading fee of \$0.12 per share (subject to change without notice to you). The Plan Administrator will deduct these amounts from the cash proceeds paid to you. Shares being sold for you may be aggregated with those of other Plan participants who have requested sales. If you opt to sell all of the shares held for you in the Plan, your participation in the Plan will be automatically terminated.

Alternatively, you may choose to sell your shares through a broker-dealer of your choice, in which case you will have to request that the Plan Administrator either (a) electronically transfer your shares to your stockbroker, or (b) issue the shares in certificate form for delivery to your stockbroker before settlement of the sale.

The Plan Administrator may determine the price for the fractional shares either by (a) selling shares on the open market through a registered broker-dealer, or (b) using the current price of our common stock on the NYSE Amex Equities, or as quoted by a registered broker-dealer on the date of the request.

If I request the sale of the shares held in my Plan account, when will they be sold?

If you request the sale of shares that are held for you in the Plan, the Plan Administrator will use its best efforts to sell your shares on the open market within five (5) business days after receipt of your sale instructions, or as soon as otherwise practicable. A check in payment of the net proceeds will be mailed to you as soon as practicable after the sale has taken place.

There can be no assurances with respect to the Plan Administrator's ability to sell your shares and no assurances as to the prices or timing of such sales, or the terms under which such sales may be transacted. Neither we nor the Plan Administrator has any obligation under the Plan, and assume no responsibility, to purchase whole shares credited to your Plan account if such shares cannot be sold by the Plan Administrator.

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DIVIDENDS

20. How will I be credited with the dividends paid on the shares I have enrolled in the Plan and/or that are being held in my Plan account?

The Plan Administrator will receive the cash dividends (less the amount of any taxes withheld) paid by us on all whole and fractional shares that are enrolled and/or held in the Plan at the dividend record date, and will credit such dividends to your Plan account on the payable date. The dividends received by the Plan Administrator will automatically be reinvested in shares of our common stock.

21. What if I decide that I would like to receive in cash some of the dividends paid on the shares enrolled or held in the Plan, rather than having them reinvested?

The Plan permits the partial reinvestment of dividends. Please see Question 7.

REPORTS TO PARTICIPANTS

22. What reports will I receive as a participant in the Plan?

As soon as practicable after each transaction, you will receive a statement with information about your Plan account, including amounts invested, the purchase and/or sales prices, and the number of shares purchased and/or sold. This statement will provide a record of purchases and sales transacted on your behalf under the Plan and you should retain it for income tax purposes. As a shareholder, you also will receive various communications, including our annual report to shareholders, notices of shareholder meetings, proxy statements, and information for income tax reporting.

ISSUANCE AND DEPOSIT OF STOCK CERTIFICATES

23. Will certificates be issued to me for shares of common stock purchased through the Plan?

Certificates for shares of common stock that are purchased through the Plan will not be issued to you, unless you request that the Plan Administrator do so. All shares will be issued to the Plan Administrator or its nominee(s) as agent, and credited to your Plan account in book entry form. The number of shares credited to your Plan account will appear on your account statements. This convenient process protects against loss, theft, or destruction of stock certificates, and reduces our costs.

Shares credited to your Plan account may not be assigned or pledged in any way. If you wish to assign or pledge the whole shares credited to your account, you must request that certificates for those shares be issued to you in your name.

Upon receipt of your request, the Plan Administrator will issue you a certificate for any number of whole shares credited to your Plan account. Certificates for fractional shares will not be issued under any circumstances.

The name on your Plan account will be identical to the name that appears on the certificate(s) underlying the shares you have enrolled in the Plan and/or that are held for you in the Plan in book entry form. Certificates for whole shares issued to you from the Plan will be registered in the same manner.

24. How can I arrange for my stock certificate(s) to be held in safekeeping by the Plan Administrator?

If you wish to submit your stock certificate(s) to the Plan Administrator for safekeeping, you should mail them (unendorsed) by registered mail, with a note requesting that they be credited to your Plan account.

You should insure the certificate(s) for 1% of the current market value, as this is the amount you will be charged for surety protection should your certificate(s) be lost in the mail.

TERMINATION OF PLAN PARTICIPATION

25. How do I terminate my participation in the Plan?

Participation in the Plan is entirely voluntary. You may terminate your participation at any time by providing notice and instructions to the Plan Administrator. Upon receipt, the Plan Administrator, in accordance with your instructions, will either (a) discontinue the reinvestment of the dividends paid on the shares enrolled and/or held in your Plan account, but continue to hold those shares in book form on your behalf; (b) issue a certificate for the whole shares credited to your Plan account and issue a cash payment for any cash in lieu of a fractional share; or (c) sell the whole shares credited to your Plan account and issue a cash payment for the proceeds plus any cash in lieu of a fractional share, less associated trading fees of \$0.12 per share and the \$15.00 transaction fee (subject to change without notice to you). Participants may also request that the Plan Administrator electronically transfer their shares to their brokerage account.

26. Can I re-enroll in the Plan?

Generally, you may elect to re-enroll in the Plan at any time. However, MSL and the Plan Administrator reserve the right to reject any re-enrollment application on grounds of excessive joining and withdrawing. This reservation is intended to minimize unnecessary administrative expense and encourage use of the Plan as a long-term shareholder investment service.

TAX INFORMATION

27. What are the federal income tax consequences of participation in the Plan?

We believe that the following is an accurate summary of the material federal income tax consequences as of the date of this Plan:

Cash dividends reinvested under the Plan will be taxable as having been received by participants, even though participants have not actually received them in cash. In addition, in the case of shares purchased on the open market with reinvested dividends or optional cash purchases, the amount of any trading fees that we pay on behalf of participants will be treated as a distribution subject to income tax in the same manner as dividends.

Each participant will receive an annual statement from the Plan Administrator indicating the amount reported to the Internal Revenue Service of: (a) reinvested dividends to be treated as dividend income; and (b) any trading fees paid by us on the participant's behalf. The tax basis per share will be the price at which the shares are credited to a participant's account.

In general, if a participant fails to furnish valid taxpayer identification number to the Plan Administrator, the participant's dividend distributions will be subject to U.S. backup withholding. The dividends, less the amount of federal income tax required to be withheld, will then be reinvested.

The rule stated in paragraph (a) above may not be applicable to certain participants in the Plan, such as tax-exempt entities (e.g., pension funds) and foreign shareholders. These particular participants should consult their own tax advisors concerning the tax consequences applicable to their situations.

In the case of those foreign shareholders whose dividends are subject to U.S. federal income tax withholding, the amount of tax to be withheld will be deducted from the amount of the dividend and only the remaining amount of the dividend will be reinvested.

The foregoing is only an outline of our understanding of some of the applicable federal income tax provisions. The outline is general in nature and does not purport to cover every situation. Moreover, it does not include a discussion of state and local income tax consequences of participation in the Plan. For specific information on the tax consequences of your participation in the Plan, including any future changes in applicable law or interpretation thereof, you should consult your own tax advisor.

OTHER INFORMATION

28. What happens if I decide to sell or transfer all of the certificated shares enrolled in the Plan but not the shares that are held in my Plan account?

If you sell or transfer all of the certificated shares enrolled in the Plan, but continue to hold shares in your Plan account, the cash dividends on the shares held in your Plan account will continue to be reinvested, unless you instruct the Plan Administrator to terminate your participation in the Plan.

29. How do I change the name on my account, transfer shares or give as a gift shares in my Plan account?

You may change the name of your Plan account, transfer shares or gift shares in your Plan account at any time by completing and submitting to the Plan Administrator a transfer of ownership form. Transfers may be made in book entry or certificated form. You can contact the Plan Administrator to request transfer instructions and a transfer of ownership form, or you can download the instructions and form online at www.bnymellon.com/shareowner/equityaccess.

If you are submitting certificates for transfer, we recommend that you send them, properly insured, by certified or registered mail with return receipt requested or some form of traceable delivery. All participants in the existing Plan account need to sign all instructions, and their signatures need to be authenticated with a Medallion Signature Guarantee as described in the instructions on the transfer of ownership form.

30. If MSL issues additional shares of common stock in connection with a stock dividend or a stock split, how will I receive the additional shares?

Any shares representing stock dividends or stock splits that we distribute on shares of our common stock that you have enrolled in the Plan and/or that are being held in your Plan account will be credited to your Plan account.

31. How will I be able to vote the shares held in my Plan account?

The shares credited to your Plan account will be automatically added to the shares covered by the proxy provided to you with respect to your certificated and book entry form shares of common stock, and may be voted by you pursuant to such proxy.

32. What are the responsibilities of MSL and of the Plan Administrator under the Plan?

Except as described below, the Plan Administrator has no responsibility with respect to the preparation or the contents of this Plan. Neither we nor the Plan Administrator or its nominee(s), in administering the Plan, will be liable for any act done in good faith. Neither we nor the Plan Administrator will be liable for any good faith omission to act, including, without limitation, any claims of liability arising out of: (a) failure to terminate a participant's account upon the participant's death before the receipt of notice in writing of the death; (b) the prices and times at which shares of

common stock are purchased or sold for the participant's account or the terms under which such purchases or sales are made; or (c) fluctuations in the market value of our common stock. Neither we nor the Plan Administrator can assure you of a profit, or protect you against a loss, from the shares purchased or sold through the Plan. An investment in our common stock is subject to significant market fluctuations, as are all equity investments. We cannot control purchases by the Plan Administrator under the Plan and cannot assure you that dividends on our common stock will not be reduced or eliminated in the future.

33. Who interprets the Plan?

MSL and the Plan Administrator reserve the right to interpret the Plan, as they deem necessary or desirable. Any such interpretation will be final. The Plan, and any related Plan documentation and Plan accounts, will be governed by, and construed in accordance with, the laws of the State of Louisiana.

34. May the Plan be changed or discontinued?

While we currently expect to offer a dividend reinvestment and stock purchase plan indefinitely, we reserve the right to suspend, modify, or terminate the Plan at any time. You will receive notification of any such suspension, material modification, or termination. We and the Plan Administrator also reserve the right to change any administrative procedures of the Plan (including fees and expenses) at any time without notice to you, and any such changes shall not be deemed material modifications to the Plan.

35. Could the Plan Administrator change?

Yes. It is possible that the Plan Administrator may resign as administrator of the Plan are any time or discontinue services as Plan Administrator. Further, MSL, in its sole discretion, may decide to replace the Plan Administrator. In any case, MSL would appoint a successor administrator to administer the Plan.

36. Who bears the risk of market price fluctuations in MSL's common stock?

You do. Your investment in shares of MSL common stock under the Plan will be no different from an investment in directly-held shares of MSL common stock. You will bear the risk of loss and may realize the benefits of gain from market price changes with respect to all MSL shares held by you in the Plan or otherwise. The shares are not deposits and are not insured by the FDIC or any other government agency.

37. Who do I contact if I have questions about the Plan?

The Plan Administrator will answer any questions you have about buying or selling our common stock through the Plan or about any other Plan services. You may contact the Plan Administrator in the following ways:

Internet. You can enroll, change your dividends election, obtain information, and perform certain transactions on your account online via Investor ServiceDirect® (ISD) at www.bnymellon.com/shareowner/equityaccess.

In order to access your account through ISD you will need to register through EquityAccess at www.bnymellon.com/shareowner/equityaccess and create a Personal ID and Password. To begin, you will need your 12-digit Investor ID, which can be found on your check stub, statement, or advice. Select Investor ID as your login method and click continue. Please follow the prompts to complete the EquityAccess registration process.

For added security, to safeguard your assets, BNY Mellon Shareowner Services requires you to authenticate your identity when you register to access your account online. If you are a U.S. resident, you may authenticate your identity online by answering a series of questions. If you choose not to utilize the online authentication process, or you are not a U.S. resident, your individual authentication code will be sent to you via the U.S. Postal Service. Written Inquiries. You may make an e-mail inquiry by following the instructions on the Investor ServiceDirect website. Please address all other correspondence concerning the Plan to the Plan Administrator at the following address:

The Bank of New York Mellon c/o BNY Mellon Shareowner Services P.O. Box 358035 Pittsburgh, PA 15252-8035

Be sure to include your name, address, daytime phone number, Investor ID, and a reference to MidSouth Bancorp, Inc. on all correspondence.

Telephone Inquiries. The Plan Administrator may be reached directly by dialing:

1-888-216-8113 (dedicated number in the United States and Canada) 1-800-231-5469 (for the hearing impaired) (TDD) 1-201-680-6578 (outside of the United States and Canada)

An automated voice response system is available 24 hours a day, 7 days a week. Customer Service Representatives are available from 9:00 a.m. to 7:00 p.m., Eastern Time, Monday through Friday (except holidays).

38. Must I notify the Plan Administrator if I change my address?

Yes. The Plan Administrator will send all notices to the Plan participant's last known address in its records. Mailing of notices to such address will satisfy any obligations we have to give you notice. Accordingly, you should promptly notify the Plan Administrator in writing or via the Plan Administrator's web site of any change of address.

If you elect to receive notices by electronic mail, you should promptly notify the Plan Administrator of any change to your designated e-mail address.

NOTE ABOUT FINANCIAL INTERMEDIARIES

We may grant requests for waiver of the Plan's maximum annual investment limit to financial intermediaries, including brokers and dealers, and other participants in the future. Grants of such waiver requests will be made in our sole discretion based on a variety of factors, which may include: our current and projected capital needs, the alternatives available to us to meet those needs, prevailing market prices for our common stock, general economic and market conditions, expected aberration in the price or trading volume of our common stock, the potential disruption of our common stock price that may be caused by a financial intermediary, the number of shares of common stock held by the participant seeking a waiver, the past actions of a participant under the Plan, the aggregate amount of investments for which such waivers have been submitted, and the administrative constraints associated with granting such waivers. If waiver requests are granted, a portion of the shares available for issuance under the Plan will be purchased by participants (including brokers or dealers) who, in connection with any resales of such shares, may be deemed to be underwriters within the meaning of the Securities Act of 1933, as amended (the "Securities Act"). Financial intermediaries may purchase a significant portion of the shares of common stock issued under the Plan. We do not have any formal or informal understanding with any such organizations and, therefore, the extent of such financial intermediaries' participation under the Plan cannot be estimated as this time. Participants that are financial intermediaries that acquire shares of our common stock under the Plan with a view to distribution of such shares or

that offer or sell shares in connection with the Plan may be deemed underwriters within the meaning of the Securities Act. From time to time, financial intermediaries, including brokers and dealers, may engage in positioning transactions in order to benefit from the discount from the market price, if any, of common stock acquired under the Plan. Such transactions may cause fluctuations in the trading volume of our common stock. Financial intermediaries that engage in positioning transactions may be deemed to be underwriters within the meaning of the Securities Act. The Plan is intended for the benefit of our current and prospective investors and not for individuals or investors who engage in transactions that may cause aberrations in the price or trading volume of our common stock.

WHERE YOU CAN FIND MORE INFORMATION

We are required to file annual, quarterly, and current reports, proxy statements, and other information with the SEC. You may read and copy any documents filed by us at the SEC's public reference room at 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at 1-800-732-0330 for further information on the public reference room. Our filings with the SEC are also available to the public through the SEC's website at www.sec.gov.

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC's rules allow us to incorporate by reference certain information into this prospectus. This means that we can disclose important information to you by referring you to another document. Any information referred to in this way is considered part of this prospectus from the date we file that document. Any reports we file with the SEC after the date of this prospectus, but before the date that the offering of the securities by means of this prospectus is terminated, will automatically update and, where applicable, supersede any information contained in this prospectus or incorporated by reference in this prospectus.

We incorporate by reference into this prospectus the following documents or information filed with the SEC (other than, in each case, documents or information deemed to have been furnished and not filed according to SEC rules):

Our Annual Report on Form 10-K for the fiscal year ended December 31, 2010 filed with the SEC on March 16, 2011;

Our Quarterly Reports on Form 10-Q for the period ended March 31, 2011 (filed on May 9, 2011), June 30, 2011 (filed on August 9, 2011) and September 30, 2011 (filed on November 9, 2011);

Our Current Reports on Form 8-K (in each case other than those portions filed under Item 2.02 or 7.01 thereof unless otherwise indicated therein) on January 14, 2011, January 26, 2011, April 4, 2011, April 27, 2011, May 27, 2011, July 28, 2011, August 2, 2011, August 18, 2011 August 29, 2011, August 30, 2011, October 26, 2011 and December 5, 2011;

The description of MSL common stock set forth in the registration statement on Form 8-A filed pursuant to Section 12(b) of the Securities Exchange Act of 1934, including any amendment or report filed with the Securities and Exchange Commission for the purpose of updating this description; and

All documents filed by us under Sections 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934 on or after the date of this prospectus and before the termination of this offering. These documents include periodic reports, such as Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, and Current Reports on Form 8-K (in each case other than those portions furnished under Item 2.02 or 7.01 of Form 8-K unless indicated otherwise in any such Form 8-K), as well as proxy statements.

We will provide without charge to each person, including any beneficial owner, to whom this prospectus is delivered, upon his or her written or oral request, a copy of any or all documents referred to above which have been or may be incorporated by reference into this prospectus (excluding exhibits to those documents) unless they are specifically incorporated by reference into those documents. You can request those documents from us by contacting:

Shaleen B. Pellerin Assistant Vice President, Investor Relations MidSouth Bancorp, Inc. 102 Versailles Blvd. Lafayette, LA 70502 Telephone: (337) 237-8343 shaleen.pellerin@midsouthbank.com

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